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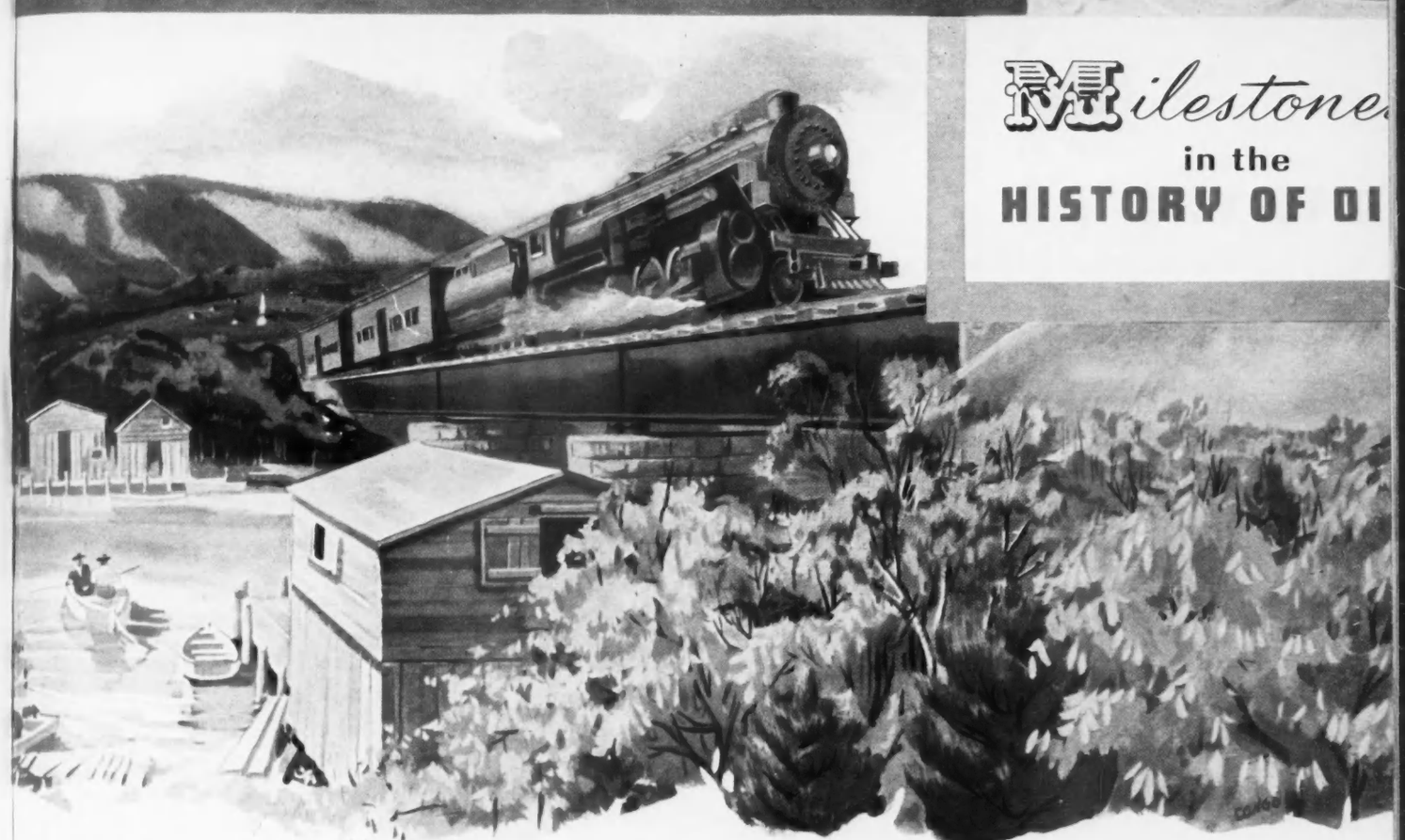
The OIL WEEKLY

FOR THE DRILLING, PRODUCING, PIPE LINE INDUSTRY

THE ROCK BIT ROAD TO PROGRESS!



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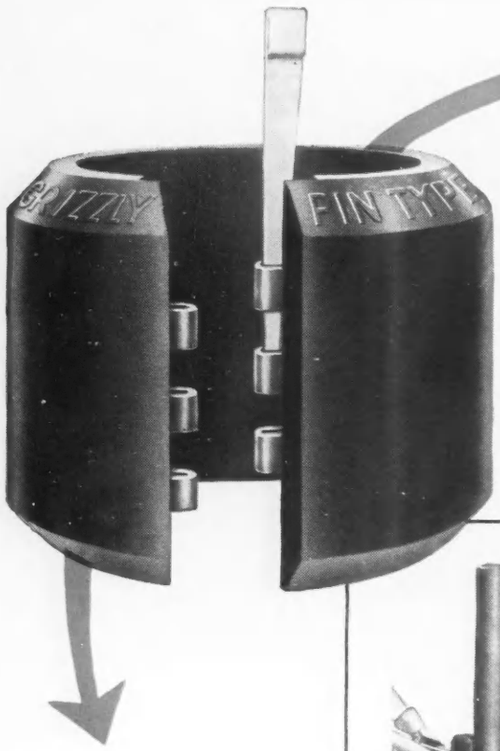
May 27, 1946

VOLUME 121, NUMBER 13



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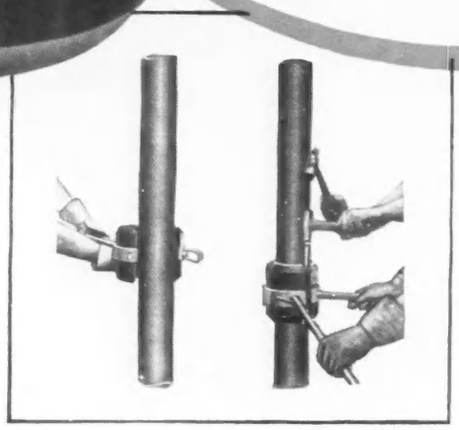

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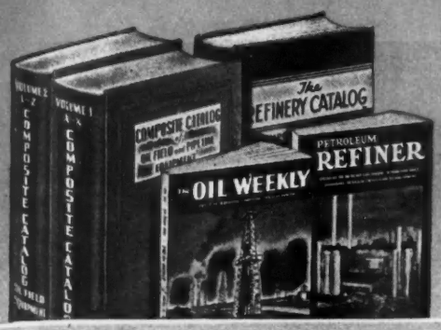

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Looking Ahead

WITH THE EDITOR

A TREND toward new oil legislation designed to attract outside operators and particularly to entice United States capital apparently is taking shape among some of the nations of Latin America.

WELCOME, NEIGHBOR!

This sharp reversal of petroleum policy of our neighbors to the south is cited in an article on Bolivia by Henry Ozanne, staff writer, and an editorial which will appear in the International Section of THE OIL WEEKLY on June 3.

The "right-about" trend apparently is prompted by the acute postwar need of the countries to step up exports and to industrialize in the face of tightening economic conditions. The domestic consumption of the Latin-American nations has soared during the war and government officials desire to supply as much of this demand as possible through development of their own oil reserves.

To this end, several countries now are engaged in mapping new petroleum laws which will be more acceptable to private capital.

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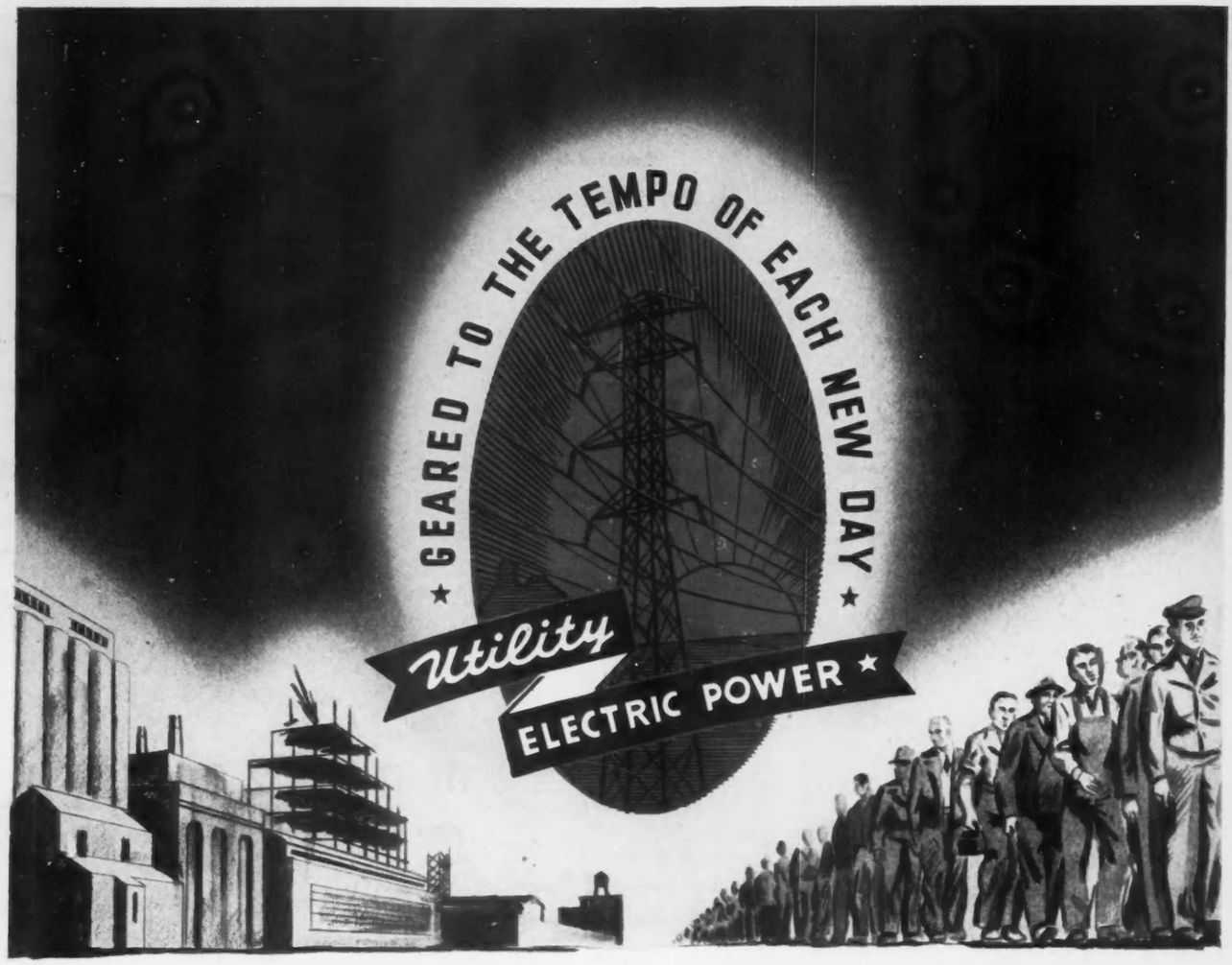

The Power Behind American Industry

It was Utility Electric Power that revolutionized industry generations ago... it was the same Power that established outstanding production records during the War. Today, the Utility Power Companies are ready to service your needs for efficient, low cost power... power that helps offset rising operating costs... power that provides the very finest performance. And how can Utility Electric Power fit into your picture? The Power Engineer of your Utility Electric Power Company has convincing facts to present, without cost or obligation, which conclusively prove that Utility Electric Power is the best power for you. Call him today.

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THE OUTLOOK

The coal strike and rail labor troubles have set back the decontrol of consumer goods industries indefinitely, and OPA officials are of the opinion that it may be several months before the industrial economy returns to the position it held in April, when plans were made to lift price regulation from a number of industries, including at least some branches of the oil industry, before Congress passed on the price control extension act.

* * * *

Given Department of Justice approval for industry cooperation, the new oil and gas division of the Interior Department will lose no time in perfecting its organization and developing its program. Officials feel that the latter is most essential to convince the industry that the new set-up is not another back-door approach to Federal control.

* * * *

State Department officials expect to be questioned closely by the Senate Foreign Affairs Committee when hearings are held on the Anglo-American petroleum agreement as to why Russia was not invited to participate, thus possibly avoiding the oil situations which have arisen in Eastern Europe and the Middle East. One answer will be that Russia never evinced any interest in the matter.

* * * *

Government restrictions on the export of fuel oils may be continued until next spring if the present thinking of the Office of International Trade is maintained. OIT officials are watching the domestic situation, and do not intend to permit any exports of residual fuel oil until it is shown that the needs of the Navy and industrial users can be met without difficulty.

* * * *

Congressional demands for prompt enactment of anti-strike legislation likely will be stilled if the administration is successful in settling the coal and railroad disputes and no other major outbreaks occur immediately. The legislation is painful to many members, torn between demands of constituents for action and the assurance of labor opposition to their re-election if they do act.

* * * *

A cross-country trip of 25 jet-propelled planes is seen in some quarters as signifying a major new development in the aviation fuel industry. The jet planes operate on kerosine and the next year or so may spell out the destiny of high octane aviation gasoline, a more costly product.

* * * *

The extent of Russia's influence in Iran will be determined this summer, when Iran holds parliament elections. Russian domination of the next Iranian parliament is a possibility. Russian influence already is entrenched in northern Iran, and is moving to the south, a British stronghold, through a vigorous reform program of the Democratic Party and the Tudeh (Masses) Party.

* * * *

Stripper well operators plan a strenuous last-minute campaign for permanent price differential and already have won some congressional support to continue the present subsidy which expires June 30.

* * * *

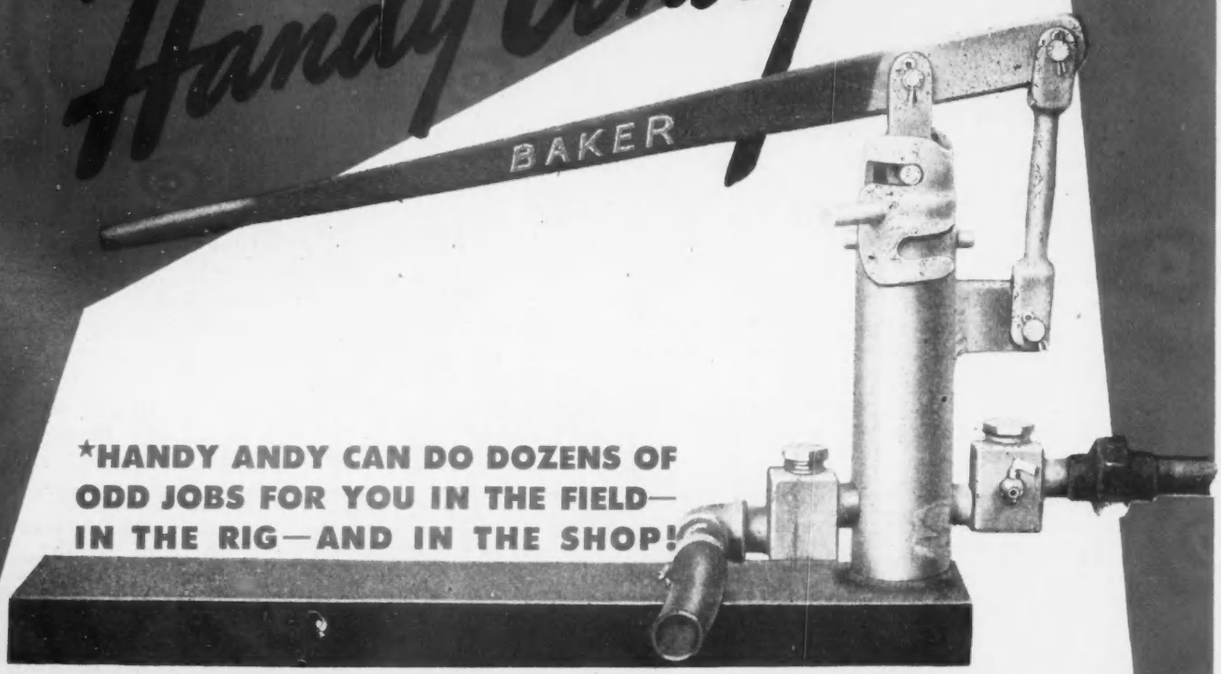
Brazilian authorities, noting the advancement of the petroleum industry in Venezuela where a number of American companies are included among the principal operators, may soon adopt a more liberal policy toward foreign capital.

* * * *

Far-reaching actions affecting the country's foreign trade and commercial policies are on the schedule for the coming months. Trade agreements are to be negotiated with at least 17 countries; an international conference on trade employment is scheduled and the setting up of an international trade organization is planned. The State Department will follow up on its suggestion that 15 foreign governments withdraw their buying missions in this country; as a matter of fact, 21 nations have oil-buying missions in the United States.

MEET

"Handy Andy"★



★HANDY ANDY CAN DO DOZENS OF ODD JOBS FOR YOU IN THE FIELD—IN THE RIG—AND IN THE SHOP!

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USED AS A TESTING PUMP—FOR REMOVING PLUNGERS FROM INSERT LINER OIL WELL PUMPS—FOR TESTING VALVES, FITTINGS, CASING AND TUBING—FOR EXTRACTING CORES — FOR MANUAL SETTING OF CEMENT RETAINERS AND SIMILAR TOOLS.

The Baker Hydraulic Core Extractor and Testing Pump is a strong, simply constructed light-weight unit capable of developing pressures up to 6,000 pounds per square inch, without undue exertion.

LOW OR HIGH PRESSURE

It has two pistons, one for low pressures and one for high pressures, the change being quickly made by merely moving the pressure shifter to engage the proper lugs for the pressure desired to be developed.

LASTS INDEFINITELY WITHOUT REPAIRS

Simple, rugged construction insures long, trouble-free service, and by pumping clear water (or water containing soluble oil) through the unit after use the essential working parts always function properly and seldom require replacement.

The Baker Hydraulic Core Extractor and Testing Pump is identified as Product No. 540, and is described in detail on Page 374 of the 1944 Baker (or Composite) Catalog.

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Fuel Fight Finds Gas Industry United

THE natural gas industry does not intend to submit meekly to any further federal control. If such control becomes inevitable, the industry wants to make it beneficial and intelligently administered.

These are the statements of E. Buddrus, president of Panhandle Eastern Pipe Line Company and also head of the Independent Natural Gas Association, who pointed out recently in Cincinnati that the natural gas industry is united for the first time since passage of the Natural Gas Act.

And well it is that it should be united, because from indications which he cited, the railroad and coal interests are doing their utmost to elicit support for their contention that the general public interest would be best served by preventing importation of gas into areas where there are supplies of solid fuels. A two-mill-per-ton pledge made by members of the National Coal Association will give that industry $600,000 for fighting "inroads" of gas and oil into their markets.

In his review of the FPC investigation material, Buddrus commented on price saying that "The higher price philosophy is advanced and amply supported as a cure for flaring oil well gas and strengthening state conservation laws and administration." States' witnesses insist that gas produtcion and gathering control is a state function. Restrictions on exportation, he said, is definitely opposed by producing and consuming states, and no federal or state agency should have "end use" control. A slight increase in the price of gas to consumers is not objectionable, if it assures adequate continuous supplies of gas.

Discoveries in 1945 have added to the nation's total reserves. "Questions by adversary attorneys indicate that our opponents propose to use estimates of the large increased demands for natural gas as a means to prove that our reserves will be exhausted in a comparatively short time," Buddrus said.

In warning the industry of the coming battle at the Washington hearing, Buddrus said natural gas adversaries are using every means possible to restrict sales.

Improving Oil's Public Relations

STANDARD Oil Company (Indiana) announces a long-range program "to give training for superior service in service stations."

"Veterans working as Standard dealers or for Standard dealers are likely to predominate in the classes at first," the statement says. "All phases of modern service station operation will be the subject matter of the course. The motoring public, driving in to buy gasoline, will be the beneficiaries of the model service given."

So much for Indiana's present plan which contemplates operating as many as a hundred service stations, complete with classroom facilities, throughout the 15 north central states where it does business.

This squib is to ask a question:

Why not, in such service station personnel schooling, also seek, as a prime objective, the establishment of better public relations for the oil industry generally?

It has long been the thought of THE OIL WEEKLY that: a) improved public relations as regards the oil industry are badly needed, would pay big dividends, and b) there is no better place to do thorough and systematic groundwork along this line than in service stations where the motoring public drives in to buy gasoline. Treatment the motorist receives, what he hears and observes—if favorable and repeated as frequently as he has to "fill 'er up"—can do much to meet the obvious need.

We're not public relations experts, but our knowledge of the subject makes us believe that a carefully-planned public educational program along this line would benefit not only the individual company sponsoring it, but the industry generally.

Pound Criticizes FPC "Absolutism"

DR. ROSCOE POUND, former dean of the Harvard Law School, named the Federal Power Commission among other federal agencies in an article in the Spring issue of "American Affairs," in which he denounced "administrative absolutism of federal agencies."

Contesting the view that "law is whatever is done officially," Pound urges that the "administrative absolutism" of federal agencies be checked immediately and effectively.

Many of the administrative agencies entertain complaints, institute investigations, begin what amounts to proscutions before themselves, allow their own subordinates to act as prosecutors and often make adjudications in conference with these same subordinates, he asserted.

"Exemptions from judicial scrutiny of its action seems to be the ambition of every federal administrative agency and is urged by a group of writers and teachers with increasing insistence," Pound declared. "As a result, with the multiplication of these agencies, the increasing subjection of every form of activity to administrative regulation and hostility of administrative agencies to all attempts to impose effective legal checks upon them, we have been coming to a condition which may well be called administrative absolutism."

Pound feels that investigation functions of government agencies can be carried on by methods which will give full hearing to both sides. Then if the agency wishes to prosecute it should be required to do so in the courts and not before itself.

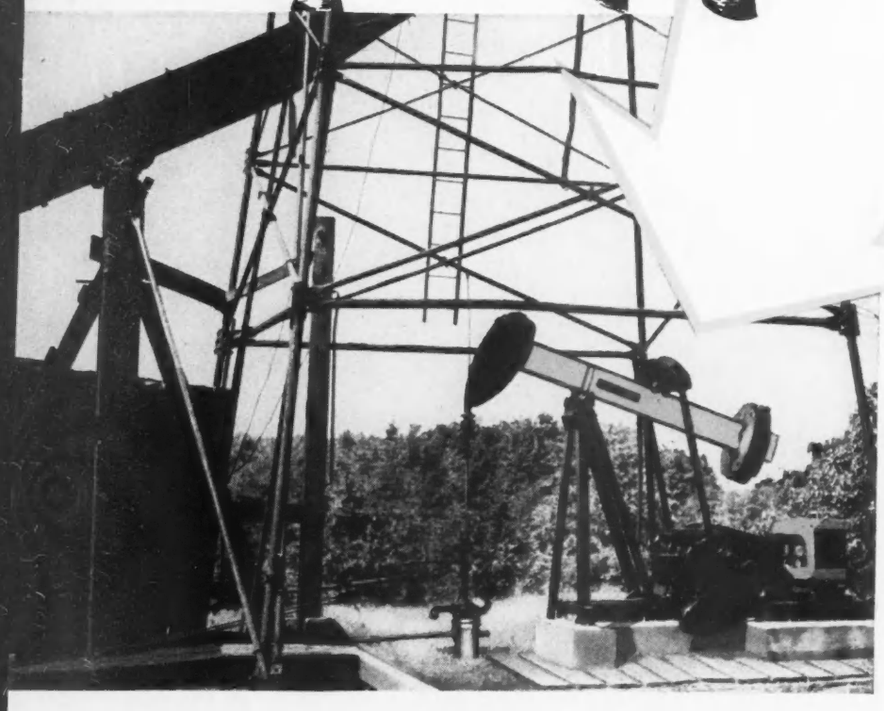
☆

If we are to exercise leadership, we must examine trends and ideas, many of which are related only indirectly to our immediate business concerns. We should furnish ourselves with facts, not prejudices—from accurate opinions, make plans and expound them.

RALPH W. GALLAGHER, Chairman of Board
Standard Oil Company (New Jersey)

Why feed a herd of broken-down horses

when ONE GOOD PONY could do the work?



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If you're still struggling along with rotting rig fronts, tattered belts, worn-out engines, and inefficient pumps, replace them with low-cost, modern, highly-efficient Bethlehem systems.

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Subsidiary of Bethlehem Steel Corporation

BETHLEHEM STEEL

The Week's News

THE Navy Department last week was disclosed to be planning the expenditure of as much as $100 million to develop a 100,000-barrels-daily crude production from Naval Reserve No. 4 in Alaska, with the participation of the industry to be invited if a reserve of a half billion barrels or more is mapped out by exploratory work now going on. Page 28.

Other Navy Projects—The Alaskan reserve will be the Navy's ace in the hole against another war, but the department also is planning all-out research on atomic energy, new fuels for rocket motors and other purposes, and development of the jet-propelled plane, all of which may have sharp impact upon the petroleum industry. Page 31.

Copper, Steel, Lead All Short—Strikes in the copper mines in January, in the copper refineries in February, and in the coal mines in April have put copper products in the same scarcity category as steel and lead, and the supply of copper bars in June is now expected to be but one-fifth to one-sixth of mill requirements.

War Plant Sold—War Assets Corporation has announced its first sale of a 100-octane aviation gasoline refinery, and is attempting to press the sale of 13 others, pointing out the favorable factors employed in reaching the "fair value" of the plant, including consideration of its location in respect to both its market, source of raw materials and other factors. Page 26.

German Production Up—German petroleum production, practically all in the British zone, is increasing slowly as a result of an intensive drive for development, but no new discoveries have been made in the past year. Story below.

Easier Wildcatting Capital—Legislation depriving the SEC of all authority over securities issued by companies engaged in oil or gas exploration or development has been introduced in Congress as a means of making it easier to raise capital for wildcatting. Page 29.

Oil Deals—J. S. Abercrombie Company properties have been sold to Old Ocean Oil Company and Fohs Oil Company plans to sell its holdings to Texas Gulf Producing Company. Page 27.

High Texas Figure—An all-time high oil production allowable has been set for June by the Texas Railroad Commission. Page 31.

Louisiana Gas Tax—A bitter fight is expected when the measure to increase the tax on natural gas in Louisiana reaches the legislature floor. Page 27.

Expropriation Conference—Negotiations looking toward fixing values on British and Dutch oil properties, expropriated by Mexico, have been discontinued. Story below.

API Housing Plan—Prospect of heavy attendance at the API meeting in Chicago in November has brought announcement of a plan for solving the housing problem. Page 28.

Kansas Pipe Line—Cities Service Gas Company asks for permit to connect Hugoton field and Kansas City with a 26-inch line. Page 27.

API Cancels Meeting—Due to the rail strike, the meeting of API directors scheduled this week in Fort Worth was cancelled. Page 26.

Landmen's Convention—First convention of landmen and scouts ever held east of the Mississippi called huge success. Page 32.

Negotiations Regarding Expropriated Properties in Mexico Are Discontinued

Mexico's Secretary of Foreign Relations announced May 20 that negotiations between the Mexican government and Great Britain and Holland regarding the valuation of the expropriated oil properties of the Royal Dutch Shell interests in Mexico had been discontinued.

An agreement between these governments had been signed last February 7 whereby the opposing parties nominated experts to work together and attempt to reach an agreement on the sum to be paid by the Mexican government as indemnification. According to the terms of the "convenio," should the experts fail to agree within a period of three months, the whole deal is declared off and the rights and obligations of the respective governments remain as they were before February 7.

The Mexican government settled with expropriated American interests, by governmental intervention and by private agreement, for about $33 million. Experienced Mexican oil operators estimate that the Shell interests composed about 75 percent of the expropriated properties and thus, should settlement be made on more or less similar terms, the amount involved will be close to $100 million.

This is an extremely important sum in the economy of Mexico and it is certain that further attempts to settle the problem of the expropriated Shell properties will be made in the very near future.

The $33 million as the agreed total payments to American interests includes unofficial estimates of outside observers regarding the private settlements made between the Sinclair and Cities Service interests with the Mexican government. It is "guessed" that the former settled for about $8 million and the latter for about $1.5 million.

The valuations of the expropriated properties covered by the Cooke-Zevada

■ CONTINUED ON NEXT PAGE

German Production Up

Production of oil in Germany (virtually all from the British zone of occupation) has increased 7 percent since December, 1945, the military governor of the U. S. zone reported last week.

March production was 401,100 barrels, against 373,800 tons, the increase being due to the completion of 30 oil wells and one gas well. Twenty operations resulted in dry holes.

At the end of March 34 rigs were in operation and 32 others were temporarily shut down. The principal operations were in the Hannover fields, it was said.

The report commented that relatively intensive exploitation and exploration drillings in the British zone have resulted in no new discoveries since May, 1945, either in the case of holes sunk for oilfield perimeter extension or by rigs operated on wildcat locations.

Other production in March included 6384 barrels of shale oil products at Messel, in the U. S. zone, and 3,521,035,321 cubic feet of natural gas in the British zone, with 250 barrels of propane.

Refinery operations in the British zone in March were realtively at the level of preceding months, with an output of 432,019 barrels, or 38 percent of the wartime peak. Emphasis has been placed upon lubricants at the expense of other products.

Liquid fuel requirements for the U. S. zone continued to increase in March, reaching a new high of 246,428 barrels, of which only 3640 barrels was supplied from indigenous sources, the remaining 242,788 barrels having to be supplied from U. S. army stocks.

Expropriation

■ CONTINUED FROM PAGE 25

agreement, as authorized by the U. S. Department of State and the Mexican government, were as follows: Standard Oil Company (New Jersey), $18,391,641; Standard Oil Company of California, $3,589,158; Consolidated Oil, $630,151; Sabalo, $897,671; Seaboard Oil Company, $487,370; total, $23,995,991.

WAA Sells First Wartime 100-Octane Gasoline Plant

Sale of the 100-octane aviation gasoline plant at Salt Lake City, Utah, to its wartime operator, Utah Oil Refining Company, for $4,148,300, has been authorized by the War Assets Administration. This will be the first plant of its type to be purchased, it was said.

The company is taking over for continued use the fluid catalytic cracking unit, vapor recovery facilities and a sulfuric acid alkylation unit, together with the attendant auxiliaries and tankage, and also is purchasing as salvageable equipment those parts of the plant not necessary for civilian production. It will produce motor gasoline of "aviation" type.

Pointing out that it still has 13 similar plants available for sale or lease, together with ten other plants having various modern refining units and three toluene extraction plants, the WAA explained that in establishing the "fair value" of the Utah plant it was necessary to evaluate not only the obsolescence of certain portions of its equipment but also the practicability of normal peacetime operation of war-inspired processes. In arriving at the sale price, WAA took into consideration the location of the plant in relation to its market and source of raw material, and the design and efficiency of its operation compared to estimated realization from the dismantling and sale of machinery and equipment.

During the week, WAA declared three more refineries surplus and invited proposals for their sale or lease as follows:

Associated Refiners, Inc., plant at Duncan, Okla., 5100 barrels 100-octane gasoline daily; Smith's Bluff, Texas, plant operated by The Pure Oil Company, rated daily capacity of 1200 barrels of aviation alkylate, and at Texas City, Texas, operated by Pan American Refining Corporation, rated capacity of 2540 barrels daily of isopentane.

Railroad Embargo Throws Burden On Oil; API Cancels Directors Meet

An almost complete stoppage of railroad traffic May 23 threw the burden of the nation's transportation on the oil industry as the government turned to motor trucks and airplanes to move mail and food.

The ODT immediately ordered an embargo with petroleum products given a priority topped only by that on food.

New and more severe restrictions on power consumption were scheduled almost immediately if the rail strike was not settled and industries which had been limping along with meager supplies, among them steel, prepared to close down completely.

The embargo was ordered for a two-week period, unless earlier terminated, and was made applicable to motor truck lines as well as railroads.

An immediate result of the rail situation was the postponement of the scheduled May 28-29 meeting of the American Petroleum Institute board of directors at Fort Worth. President William R. Boyd, Jr., said another date will be announced after the situation clears up. In the meantime, he said, the Institute's Division of Transportation and the Washington office are working closely in cooperation with the ODT on problems within its jurisdiction relating to oil.

Maddox Elected

G. S. Maddox, geologist for Carter Oil Company, recently was elected president of the Oklahoma City Geological Society, to succeed Ralph L. Fillmore.

Other officers elected were: Harold Kleen, Skelly Oil Company, vice president succeeding Roy McAninch of Consolidated Gas Company, and Frederick Kate, Shell Oil Company, replacing Carl A. Moore, secretary-treasurer.

MID-CONTINENT SECTION AIME OFFICERS

Newly elected officers and executive committee members of the Mid-Continent Section, American Institute of Mining and Metallurgical Engineers, pictured above, will be installed at a banquet to be held in Tulsa May 29. Front row, left to right: Roy Smith, Stanolind Oil & Gas Company; W. A. Bruce, Carter Oil Company, second vice chairman; W. B. Berwald, The Ohio Oil Company, chairman; R. C. Earlougher, Earlougher Engineering Company, first vice chairman; P. P. Manion, Jr., Stanolind Oil & Gas Company, secretary-treasurer; and P. E. Fitzgerald, Dowell Inc. Second row: R. G. Hamilton, Schlumberger Well Surveying Corporation; L. L. Gray, Gulf Oil Corporation; L. E. Elkins, Stanolind Oil and Gas Company; H. F. Beardmore, Barnsdall Oil Company; A. R. Denison, Amerada Petroleum Corporation; Stanley Wilcox, Seismograph Service Corporation; and H. M. Cooley, Bethlehem Steel Company. Also on the executive committee are W. H. Carson of the University of Oklahoma, E. A. Stephenson of the University of Kansas, and R. W. French of the Continental Oil Company, not pictured.

Old Ocean-Abercrombie Deal Believed To Involve $54 Million Consideration

Old Ocean Oil Company, recently incorporated under the laws of Delaware, last week purchased the capital stock of J. S. Abercrombie Company. The consideration was not revealed but most reports have placed the price at about $54 million.

Old Ocean announced that the transaction was for a cash consideration and that in connection with financing the purchase it had borrowed $30 million from Guaranty Trust Company of New York and Chemical Bank and Trust Company of New York on 10-year notes and had placed with Stanolind Oil and Gas Company an issue of 20-year debentures in a substantial amount.

The Abercrombie company is one of the principal owners of the Old Ocean field in Brazoria County, Upper Texas Coast, where, with Magnolia Petroleum Company, it operates a large recycling and extracting plant. It has extensive holdings in Conroe and East Texas fields and in South Louisiana. Current production is about 14,500 barrels daily.

Stockholders in the new company were reported as Lloyd Noble, Noble Drilling Company, Ardmore, Okla., Carlton R. Winn, Dallas attorney for Stanolind, and Harry C. Weeks of Fort Worth. The firm will be headed by Winn as president and Noble as a vice president.

J. R. Butler of the Cotton Valley Operators Committee, which operates plants in North Louisiana, will be vice president and general manager.

The trade climaxes a series of rumors concerning the sale of the Abercrombie company which have been circulating since Harrison Oil Company was sold to Magnolia Petroleum Company several years ago for a reported price of $27 million.

Directors of Old Ocean Company are Noble, J. L. Cleveland, president of the Guaranty Trust Company of New York, Butler, Winn and Weeks. The new board of directors of J. S. Abercrombie Company includes Butler, Winn, Weeks, Noble and J. P. Roetzel.

Near Record Deal

This is one of the largest deals for producing properties ever reported in the oil industry. It was exceeded only by Sunray Oil Company's recent purchase of Transwestern Oil Company for a reported consideration of $60 million.

Magnolia, which owns half of the Old Ocean field through its purchase of the Harrison Company, said management of the joint property was subject to negotiation.

Texas Gulf Producing Would Buy Fohs Company

The majority interest in Fohs Oil Company, Houston, will be purchased by Texas Gulf Producing Company contingent on 70 percent of the stock being offered to Texas Gulf by June 10, F. Julius Fohs announced last week.

Fohs, president of Fohs Oil Co., said that he and other big stockholders in the company had agreed to sell their interests to Texas Gulf for $11 a share and that the offer is open to all of the Fohs Company's nearly 600 stockholders who will be notified by mail of the details. Consideration will approximate $6 million if 70 percent of the stock is purchased.

Incorporated in Delaware in 1932, Fohs Oil Company has considerable oil and gas holdings in Louisiana, Mississippi, Arkansas and Texas. Total assets for the year ending December 31, 1945, were $3,645,943. Gross operations in 1945 totaled $1,894,498 and the company showed a net profit of $627,604.

This is the third major purchase by Texas Gulf in two years. The company purchased Snowden and McSweeney Company in 1944 and Ohio Fuel Supply Company in February, 1946.

Texas Gulf has considerable production in the Barber's Hill field and some in South, West, North and East Texas. Total assets of the company at the end of the first quarter of this year were $9,598,850.

Lawrence S. Reed is president and W. H. Hendrickson is vice president and treasurer of Texas Gulf.

Cities Service Planning Hugoton-Kansas City Line

Cities Service Gas Company last week laid before the Federal Power Commission the greatest part of its $30 million, four-year construction program, a $23 million project for the building of a 405-mile, 26-inch line from the Kansas portion of the Hugoton field to the Wichita and Kansas City areas.

The project also contemplates the building of a 12,000-horsepower compressor station and dehydration plant in the field and approximately 33.5 miles of 16-inch loop line from its Cotton Valley measuring station along its present 16-inch line to Craig County, Oklahoma.

The company's application stated that a market survey last December indicated that during the next four years its peak-day domestic demand will be increased by 220 million and its industrial demand by 76 million cubic feet daily.

The company proposes to begin construction of the project about April 1, next.

(See page 62 for further Cities Service proposals.)

An application also has been filed by Southern Natural Gas Company for authority to construct 80 miles of 16-inch lines from the Gwinville gas field to its main line at Pickens, Miss., at a cost of $2,511,400, to transport gas to be procured under an agreement with Superior Oil Company for the purchase of at least 5 percent of Southern's annual line requirements.

The commission has scheduled a hearing at St. Louis June 10 on the application of Mississippi River Fuel Corporation for construction of 264.5 miles of 22-inch, 13 miles of 12-inch and one mile of six and ten-inch manifold river-crossing lines, as loops along its main trunk pipe line.

Stiff Fight Expected On Louisiana Gas Tax

Bitter debate is expected when a bill to increase the state's gas gathering tax from one-half cent to three cents per 1000 cubic feet comes to the floor of the Louisiana State Legislature at Baton Rouge.

The bill is sponsored by the State Office of Natural Gas Conservation, but the entire administration is not in accord. At a hearing before the State Revenue Code Commission, W. Harry Johnson, head of the State Department of Commerce and Industry, and Major B. A. Hardey, chairman of the State Minerals Board, opposed it on the ground that the increased tax would migitate against retention and expansion of industry in Louisiana. Gas Conservation Director P. A. Frye contended that it was a conservation measure justified by low well-head prices for gas and that the pipe line companies could absorb a considerable raise without passing it on to consumers. The commission has not yet completed its recommendation.

Frye also is sponsoring a measure that would give the Public Service Commission jurisdiction over gas pipe lines operating entirely within the state, including supervision over prices charged by the pipe line companies for gas sold directly to industries. A similar measure received an unfavorable committee report in 1944. Frye's statement said that oil pipe lines have been regulated in the state since 1921, but only those gas lines selling gas for resale, thus coming under FPC jurisdiction. The sales comprise less than four percent of the total.

Frye's Reasoning

"There is every reason for gas as well as oil to be regulated," Frye said. "Gas more directly affects the public interest and more people are concerned with gas than oil. At present there is no way of determining if burner tip rates to domestic and small commercial consumers are excessive. By comparison with those paid in other states they seem so."

Frye said domestic consumers in Louisiana pay an average of 63.1 cents per 1000 feet as compared with 36 cents in West Virginia, 48.5 cents in Arkansas, and 46.5 cents in Oklahoma. The gas industry's legal committee has pointed out that domestic consumption of gas in West Virginia is considerably higher because of the colder climate and that rates were consequently reduced.

Navy Would Spend $100 Million for Sizable Oil Production in Alaska

Faced with the prospect that, with its presently known reserves, the United States could not oil another major war, the Navy Department is prepared to spend up to $100 million to develop a supply of 100,000 barrels daily from Naval Petroleum Reserve No. 4 in Alaska.

Navy officials, together with L. W. MacNaughton of Degolyer and MacNaughton, special consultant to the Secretary, and A. H. Chapman, vice president of Hoover, Curtice and Ruby, Inc., who are managing the exploration program, recently laid the department's cards on the table before the House Appropriations Committee during consideration of the Navy appropriation bill for the coming fiscal year, and obtained an appropriation of $9.6 million to complete the three-year program of research and drilling, additional to the $2,120,000 previously appropriated.

The witnesses before the committee emphasized that the Navy is not undertaking a "Canol project," and will consider development of the reserve only if a substantial potential—a half-billion barrels or more—is mapped out.

They told the committee that when Japan capitulated last August, the supply of oil available to the United Nations was not sufficient to have permitted continuance of all-out operations for more than another three or four weeks, and that PAW was preparing to order restrictions on oil consumption far more severe than had previously been resorted to, including a sharp reduction in gasoline rations for A-card holders, strike control, allocation of foreign shipments, production of oil which was highly uneconomic to get out, the bringing in of production from other foreign sources and cutting off some supplies to our allies.

California Supply

The Alaskan supply, they said, is being sought principally to fuel Pacific Ocean operations. Experience during the war demonstrated that California could not supply the necessary oil, and indications now are that by 1955, and possibly earlier, that state will not be able to produce sufficient petroleum either to operate its present refineries at full capacity or to satisfy its normal peacetime requirements for products.

The Navy now is drilling its first well in the reserve, at Umiat, and ran it to 1856 feet last season. It is planned to push it to 6000 feet this year and if it is a dry hole, to try another location five or six miles to the east. If the second test fails, it is probable that activities will be shifted to other anomalies such as the one that is developing at Cape Simpson, where there is assurance of oil.

The program calls for drilling of seven or eight test wells in various parts of the reserve, only the eastern third of which has so far been studied. If a half-billion or more barrels of oil are mapped out, and those connected with the project are confident it will be, the Navy then will give consideration to the installation of facilities to move it out. Thus, it was explained, the procedure will be the opposite of that followed by the Army in its Canol project, where refinery and pipe line facilities were built before reserves were developed, and the Navy will not sink any considerable sum in facilities unless their usefulness is demonstrated.

If oil is found in sizable volume, any one of several proposals for development may be considered, it was indicated. One idea is that the industry might be invited to develop both outside and within the reserve, the latter on a percentage basis, with the government providing transportation facilities at a fair price to insure the oil being marketed. Another idea is to develop the reserve, transport the oil to the West Coast and turn it over to the companies in exchange for the right to a corresponding amount of oil in the ground within the continental United States, thus giving the Navy sources of oil both within and outside the states.

Cost Is Detailed

To develop an output of 100,000 barrels a day from the reserve would cost $50 to $95 million, department experts estimated. The biggest variable was the cost of drilling 400 wells, which would spot them at mile intervals in producing area, which might run from $10 to $40 million. The cost of a pipe line road is estimated at $13 to $17 million, and the cost of a pipe line at $23.5 to $30 million. Geologic and preliminary work would cost from $2.5 to $5 million, and a marine terminal from $1 to $3 million.

It is estimated that crude from the reserve can be delivered from Alaskan warm water ports to the San Francisco refinery area by tanker at a cost of from 15 to 21 cents per barrel, and can be transported from the field to tidewater by pipeline at a cost of from 23 to 33 cents per barrel.

Manufacture of synthetics on a comparable scale of 100,000 barrels a day cannot at this time compete economically with the development of the reserve, providing the latter project can be carried out within the estimates, the committee was told, although it is possible synthetic production costs may be reduced by technical information recently obtained from Europe. At the worst, however, the Navy project will have an advantage for a period of ten years, when synthetic production may be vastly improved.

The Navy does not contend that the Alaskan reserve, if developed, will guard us against all future requirements of petroleum for war, it was declared by Commodore W. G. Greenman, director of naval reserves, "but there is no place on the West Coast today that offers any future hope.

"Must Be Prepared"

"We hope that we are not going into another war, but we must be prepared for emergencies, and oil being so vital to war operations, it certainly would be most improvident to have a potential oil area such as this one in Alaska and not do something about finding out what it contains.

"This last war allowed sufficient time to develop production. The next war will certainly not be so considerate."

Members of the committee criticized the cost of the Navy's Elk Hills operations, but Greenman pointed out that while the government has spent some $13,094,000 under the unit plan contract and has received $12,588,000 from the sale of oil, thus being in the red about $506,000, had the program continued for the full 18 months authorized by Congress, as it would had the war continued, the venture would have cleared about $5 million.

Production at Elk Hills, when operations were cut back to 15,000 barrels a day last August, had brought the Navy 12,762,162 barrels of crude, 1,130,540 barrels of natural gasoline and 1,941,958,000 cubic feet of natural gas, he reported.

API Housing Plan

How to make reservations for the 26th annual meeting of the American Petroleum Institute at Chicago Nov. 11-14, 1946, was explained last week by President William R. Boyd, Jr.

A number of Chicago's larger hotels, including the Stevens, API headquarters, will make reservations only through the API Housing Committee which comprises L. S. Wescoat, Sheldon Clark, B. L. Majewski and A. W. Peake.

Hotels included in the plan are the Stevens, Atlantic, Bismarck, Brevoort, Chicagoan, Continental, Harrison, LaSalle, Palmer House and Planters. Those who wish to arrange accommodations at hotels other than the above should do so directly with the hotel.

Requests for reservations should be made as soon as possible, but not later than July 15.

Group reservations (those for more than one room) should be made by letter to the committee giving names of individuals for whom reservations are being made; dates of arrival and departure; type of accommodation desired, and whether or not reservations may be made at other than the Stevens Hotel.

"With record attendance expected at the coming annual meeting," Boyd said, "it will be helpful if all who wish to attend will follow these simple instructions." Boyd said he felt that "the committee will be able to handle the situation satisfactorily."

Southwestern API Production Heads

NEW OFFICERS SOUTHWESTERN DISTRICT API DIVISION OF PRODUCTION

Left to right, back row: W. V. Vietti, The Texas Company, Houston, elected chairman; Ted Winn, Sun Oil Company, Dallas, retiring chairman; N. N. Jones, Humble Oil & Refining Company, Overton, vice chairman for East Texas; B. J. Dowd, Union Producing Company, Shreveport, vice chairman for Arkansas and North Louisiana. Left to right, front row: Robert A. Seale, The Globe Supply Company, Shreveport, secretary-treasurer; B. C. Craft, Louisiana State University, Baton Rouge, vice chairman for South Louisiana; and R. E. Bridges, Humble Oil & Refining Company, Houston, vice chairman for Texas Gulf Coast.

Not shown in the picture are the following officers: Ed Warren, Carl B. King Drilling Company, Midland, Texas, vice chairman for West Texas and New Mexico; Jo Cable, consulting engineer, Wichita Falls, Texas, vice chairman for North Texas; and Alec M. Crowell, Mississippi Oil & Gas Engineering Committee, Jackson, vice chairman for Alabama and Mississippi.

Would Free Exploration From SEC's Red Tape

Charging that the provisions of the Securities and Exchange Act and the requirements of the Securities and Exchange Commission are proving a deterrent to oil and mining operators seeking to obtain capital for exploration and production. Representative Berkeley L. Bunker of Nevada last week urged Congress to exempt from SEC control securities issued for such purposes.

Introducing a bill to that end in the House, Bunker told the members that other laws are adequate to prevent any "blue sky" promotions and criticized the "unnecessary red tape" of the SEC and the "absurd legal barriers" it has set up.

"I am confident that our laws dealing with fraudulent practices and misuse of the mails are adequate to protect the investing public without further intermeddling by the Securities and Exchange Commission," Bunker said.

"I am certain, too, that our search for strategic metals must move forward on a broader scale. The war made tremendous inroads into our visible supplies.

"We have many people today who are willing to assist financially in the quest for needed minerals and metals, but they are restrained by absurd legal barriers.

"There is no doubt in my mind but that the SEC has exceeded the authority Congress intended it should exercise. I have in mind, particularly, the attempts of that bureau to dictate evaluations of property in the process of exploration and to set up certain fantastic accounting routine. Also the SEC has invoked some impractical regulations concerning data that must be included in promotional publications."

Oil-World Exposition in Houston May Be Revived

The initial step toward revival of Houston's Oil-World Exposition probably will be taken sometime in June when the executive committee will meet for reorganization purposes, Chase Sutton, The Pure Oil Company division manager, and executive vice president of the show, announced last week.

The biennial oil field equipment show was temporarily abandoned during the war years.

The first meeting of the executive committee probably will be for the purpose of selecting a new directorate and a new president. John R. Suman, formerly Humble Oil & Refining Company executive and now vice president of Standard Oil Company (New Jersey), has resigned as president of Oil-World Exposition.

If revived, the first postwar exposition would not be scheduled before 1948.

Navy to Require 23 Million Barrels Fuel Oil for Year

Navy fuel requirements during the fiscal year beginning July 1 will cost in the neighborhood of $38.4 million, and will include 23,492,779 barrels of fuel oil, 5,771,334 barrels of diesel oil, 179,970 barrels of motor gasoline, 98,448 barrels of aviation gasoline and 5480 barrels of kerosine, it was disclosed during hearings on the department' appropriation bill, released last week.

Testimony before the committee disclosed that for the current year the consumption will include slightly more than 90 million barrels of fuel oil, costing $81.5 million, and the over-all cost of all petroleum products will be in the neighborhood of $158 million.

The Navy buys little fuel oil on the East Coast, getting it mostly in the Gulf and Aruba and moving it itself, transporting it to the East Coast at a cost of something under 40 cents a barrel, department officials testified. Supplies procured in the Persian Gulf are purchased from Arabian-American Oil Company and Bahrein Petroleum Company and some purchases also are being made from Anglo-Iranian Oil Company. The price there, it was said, is $1.05 per barrel, as compared with 95 cents a barrel at Aruba. It was disclosed that the department is paying considerable attention to new fuels, particularly for use in rocket-propulsion.

Stanolind to Complete New West Texas Line by June 1

Stanolind Pipe Line Company has purchased right-of-way for the extension of its West Texas pipe line system from the Wasson field to the Jones Ranch field, northwestern Gaines County, using 5 miles of 4-inch line. McVean and Roberts Construction Company, Odessa, Texas, has contract to build the line, and complete by June 1. The three 11,200-foot Devonian wells owned by Amerada Petroleum Corporation have a bonus allowable of 240 barrels daily each.

Continental Pipe Line Company will extend its North Texas crude system from booster station in the Swastika field, southwestern Archer County, to the Ewalt 8-well field, Throckmorton County, using 20 miles of 4-inch pipe. Golden & Stearn Pipe Supply Company has the construction contract. Panhandle Refining Company, which discovered the Ewalt field in 1944, is furnishing the pipe and will be refunded from pipe line tariffs. The 20-foot lengths of pipe were originally fabricated for shell casings.

Short Course Offered

A total of 165 students have enrolled for a short course in gas appliances June 11-14 at the University of Tulsa, according to Dr. F. T. Gardner, professor of chemistry and director of the course. The course will include combustion principles, burner design and operation, installation of vents and flues, space heater installation, floor furnace installation, circulating heating systems and temperature control equipment.

Transfer of Land Leasing Authority To Interior Is Submitted by Truman

Long-continued efforts of the Interior Department to obtain control over the mineral deposits on lands held by the Department of Agriculture will come to fruition under reorganization programs submitted to Congress last week by President Truman.

Under those programs, Interior would be given jurisdiction over the deposits on foreign lands acquired under the Weeks Act, lands acquired in connection with the rural rehabilitation program, and lands acquired by the Department of Agriculture as part of the government's effort to retire submarginal lands.

The Interior Department will extend its administration of the Leasing Act to these lands, making for uniformity.

In Interior itself, the program calls for the consolidation of the General Land Office and the Grazing Service into a Bureau of Land Management. The two agencies now divide responsibility for the major portion of the multiple-use federally-owned lands held by the department, and the merger will provide for greater efficiency in administration.

The transfer from Agriculture to Interior of administration of the leasing of government lands for oil and minerals apparently marks the limit to which, for the present at least, the administration will go in concentrating government oil activities in a single department.

Considerable significance was seen in the President's failure to transfer the naval reserves from Navy to Interior, a step which former Secretary Ickes had long advocated, together with the transfer of Agriculture's leasing operations.

In informed circles it was held that there is little chance that the naval reserves will ever go back to Interior where, a quarter century ago, they were the subject of the still-remembered Teapot Dome scandal, and it is argued that, even if such a change was ordered, Congress would quickly disapprove of it.

Under the reorganization act, the President is required to submit his programs to Congress and, if not acted upon within 60 days, they automatically become effective.

Revised OPA Bill Likely Despite Truman's Appeal

Appealing to Congress for a one year extension of the price control law without change, which he will not get, President Truman announced last week he will not approve the bill if enacted in the form passed by the House.

The President advised Chairman Wagner of the Senate Banking and Currency Committee and in his letter he ignored the industrial investigation resulting from the coal strike and the then imminent railroad walkout.

"Today we are attaining production levels unprecedented in peacetime," he said, "but, as a result of uncertainty about prices and growing fear of inflation, the country is already experiencing a creeping economic paralysis from speculation and the withholding of goods."

He said also that the price control measure is "the most important issue before Congress," but members attempting to enact anti-strike legislation disagreed with him.

The price control bill being whipped into shape in the Senate Banking and Currency Committee will be milder than that passed by the House, but will probably contain a provision setting up a control board to decide when it is safe to free a particular commodity or industry from price ceilings.

The recent change in the supply situation as a result of the coal strike appears to have convinced the committee that the House provision for release of commodities when their production equals the 1941 rate was too inflexible, in view of the increased population and accumulated demand.

The committee also is expected to trim the House provision that ceiling prices must reflect cost plus a reasonable profit all along the line, to keep profit margins within more definite bounds, but it will uphold the House in abolishing the maximum average price regulation designed to insure the production of low-cost as well as high-cost lines.

The Senate group also has agreed to continue subsidies until May 1, 1947, instead of ending all December 31, next, as proposed by the House.

Involved Procedures Of OPA Is Criticized

Industrialists who have been conferring with OPA regarding price ceiling increases and suspensions comment acidly on the involved procedures which the agency has established.

The routine on applications for price relief following the granting of increased wages, they report, is as follows: OPA sends the application to the Office of Economic Stabilization; OES refers it to the Wage Stabilization Board to rule whether the wage increases can be accepted for pricing purposes; Wage Stabilization reports back to OES, and OES returns the application and its ruling to OPA.

They also complained that OPA is holding up the release of industries from price control if even one small segment of an industry is not up to 1941 production levels, or is not able readily to meet all demands. On this basis, it is pointed out, practically every industry in the country can be retained under control almost indefinitely.

In the case of the petroleum industry, the residual fuel oil situation would be sufficient to keep controls on all branches, and that OPA has this in mind is indicated by recent disclosures that it is planned to suspend gasoline price ceilings alone as the first step toward release of the industry.

Oil Pact Hearings Likely Next Month

Hearings on the Anglo-American petroleum agreement may be called by the Senate Foreign Relations Committee next month with a view to ratification before Congress adjourns in July.

Returning from the Paris meeting of the Big Four ministers, Chairman Tom Connally said this week he was willing to call hearings any time desired by the State Department and would give all interests full opportunity to be heard. It is not expected, however, that any action to that end will be taken before June 3, "filing date" in Texas of contestants in the congressional races.

At the State Department, officials said they were prepared to defend the agreement and discounted the importance of the opposition, expressing the belief that much of it is founded upon misconceptions of what actually is in the treaty.

Maximum Octane Rating Cut Because of Lead Shortage

The Civilian Production Administration this week will order reduction of the maximum octane rating of premium gasoline from 80 to 78 in line with recent recommendations of the refining industry and June lead allocations, also due to be announced, will be smaller than those for the current month.

The situation in lead, zinc and copper—the three metals are tied together—has become increasingly serious. The premium price plan for the three metals, due to expire June 30 if Congress does not act, is before OPA for revision, but the mine operators contend they cannot discuss wage increases with their miners until they know wether they will get a compensatory price increase.

The cut in lead allocations for June will be across the board with every consuming industry taking its share.

Strippers Ask Immediate Plan to Save Nation's Oil

Executives of the National Stripper Well Association and representatives of the National Oil Conservation Committee, meeting in Tulsa last week, agreed that the most practical means of keeping stripper wells from being abandoned is for the government to continue to provide a conservation payment.

Thirty oil producers from 15 states unanimously agreed on the need for a general crude oil price increase, but said that such an increase would be inadequate to the need of the stripper well operator. They pointed out that greatly increased costs of operating stripper properties have threatened the abandonment of many operations and has already curtailed application of secondary recovery methods.

Premature abandonment of wells, forcing users to depend upon oil from shale or coal at an estimated $22.25 per barrel, can be prevented by a conservation program set up now while the price of crude oil is low, the conference declared.

Atomic Power Plants for Propulsion Of Ships to be Studied by U.S. Navy

The Navy Department is preparing to get into the race for commercial development of atomic energy, and will institute a $2,640,000 program in July of which $1,056,000 will be devoted to the development of atomic power plants for ship propulsion.

Now dependent upon oil for fuel, Navy scientists are looking to nuclear energy as the possible basic motive power in the next war—a development which may so increase the speed of ships that redesigning of the whole underwater body will be necessary.

Research on the atom will go farward coincidentally with exploration of the Navy's petroleum reserves, research on oil fuels and other activities. Whether the next war will be fueled by oil or atomic energy will depend upon how soon it occurs and how far the latter has been developed when it does occur.

The program is destined to go forward regardless of the results of tests of the atomic bomb to be made at Bikini in July, which it has been predicted in some quarters may show navies to be obsolete.

Submarines First

First efforts toward utilization of atomic energy at sea will be directed to development of motive power for submarines, which now travel on the surface with diesel motors and underwater with batteries which must be recharged at frequent intervals and from which only limited speeds can be secured.

Development of antisubmarine equipment by the American and British military during the war will render submarines obsolescent unless power plants of appreciably greater capacity can be developed, Navy experts say. Power plants for surface vessels, particularly small ones, is also an important matter, but somewhat less than in the case of undersea craft.

There are a great many scientific and engineering problems which do not involve use of atomic power materials that must be solved before marine atomic power plants can be developed, among them the problem of protection against radiation, and this primary work may take several years before even a pilot plant can be constructed.

Naval experts explain that atomic energy plants will weigh less than the currently used engines and bunker fuel supplies which must be carried, and this saving in weight can be used to make the hull plates much heavier and to make the structure of ships much stronger, and in this way atomic energy may contribute to protection against atomic bombs and torpedoes.

Support of Science Urged

It is freely admitted that the whole question of atomic energy is still largely in the realm of the unknown, and although the bombs dropped on Hiroshima and Nagasaki were dramatic demonstrations of the power that exists in the nucleus of the atom, scientific knowledge of nuclear phenomena is not very far advanced from the position occupied before the war. The work done during the war, it was emphasized, consisted largely of developments and applications of previously acquired knowledge.

"Now we feel it is extremely important to support the scientific fraternity in its attempt to gain further knowledge of the atomic nucleus and its potentialities," said Captain R. D. Conrad, director of scientific planning.

June Figure for Texas Sets Record for State

The Texas Railroad Commission early last week set the June allowable at the highest figure in the history of the State. In order to fill the demand indicated by nominations, allowables for all fields were ordered at their maximum efficient rates, unless they were producing at that rate already. The total crude allowable was set at 2,425,013 barrels daily which was 155,000 barrels higher than the largest production ordered during the war.

The commission estimated under production at 5.44 percent, or 131,921 barrels daily. However, to this should be added 170,673 barrels of distillate and condensate which will mean a total production estimated of 2,463,765 barrels of all oils.

The new crude allowable exceeded nominations by 24,000 barrels a day. In the past the Commission has rarely allowed as much as 90 percent of the nominations, which totaled 2,439,000 barrels for the month of June.

The Bureau of Mines estimated demand at 2,500,000 barrels, so that the production of all oils will exceed the Bureau estimate by 413,765 barrels per day.

The fields generally are to produce 26 days, but East Texas was cut to 21 days which meant a daily average allowable for that field of 330,396 barrels, or 62,550 barrels less than it was allowed in May.

The commission scheduled its next statewide hearing for June 18, at Austin, and will consider evidence for an order to last 60 or 90 days.

The commission likewise announced it would soon hold hearings to check the maximum efficient rates of flow for Texas oil fields. This will provide information which will permit adjustment of allowables.

Crude Oil Production in the United States

(Estimates compiled by the OIL WEEKLY. All figures indicate daily averages in barrels.)

STATE OR DISTRICT	PRODUCTION IN WEEK ENDED May 25	May 18
Alabama	1,100	1,100
Arkansas	72,500	72,250*
California	867,300	863,600
Colorado	28,800	28,000
Florida	250	250
Illinois	209,600	208,200
Indiana	19,500	18,950
Kansas	270,150	261,350
Kentucky	30,900	31,250
Louisiana	370,100	370,100*
North Louisiana	78,650	78,650*
South Louisiana	291,450	291,450*
Michigan	46,150	47,150
Mississippi	63,150	61,850
Missouri	100	100
Montana	19,700	19,800
Nebraska	750	750
New Mexico	95,300	95,750
New York	13,400	13,650
Ohio	5,750	7,950
Oklahoma	373,900	373,400
Pennsylvania	38,300	38,000†
Tennessee	35	35
Texas	2,114,800	2,114,800
Upper Gulf Coast	486,000	486,000
East Texas Field	388,800	388,800
Rest of Eastern Texas	139,600	139,600
Southwest Texas	331,500	331,500
West Texas	521,100	521,100
North Texas	164,800	164,800
Panhandle	83,000	83,000
West Virginia	7,900	8,300
Wyoming	112,950	112,950*
Total United States	4,762,385	4,749,535†

* Revised to exclude condensate production.
† Revised.

Total stocks, foreign and domestic, May 18, as reported by the Bureau of Mines were 222,113,000 barrels with a daily average production of 4,751,000 and runs to stills 4,756,000.

Houston Oil Man Honored By Veterans at Barbecue

Veterans and friends of E. I. (Tommy) Thompson, Houston independent oil operator, last week expressed appreciation for publication of the *Newswheel*, a monthly morale-builder distributed during the war to servicemen in all parts of the world. "A Toast to Tommy Thompson," the affair was called, culminated by presentation of War Bonds with a maturity value of $9000 to the honoree.

E. I. Thompson

Several hundred persons heard another Houstonian and ex-serviceman, St. John Garwood, trace the inception and growth of the *Newswheel*, and praise Thompson's efforts in its behalf. Many ex-Newswheelers learned for the first time of Thompson's activity in bringing wounded veterans to Houston from the McCloskey Hospital for entertainment, and of his leadership in establishing the Veterans Service Center in Houston.

Thompson, who stated that he had already received ample reward for his work by the hundreds of appreciative letters received from Newswheelers all over the world, attempted to donate the War Bonds to the Veteran's Service Center, but was forced by popular demand from his audience to agree to keep the gift.

Four Hundred Scouts and Landmen Attend First Postwar Convention

Approximately 400 oil scouts and landmen were in Jackson, Miss., last week to attend the 23rd annual meeting of the National Oil Scouts and Landmen's Association, the first such convention of the organization to be held since the beginning of the war and the first to be held east of the Mississippi River. The meeting was the largest ever held by the group.

Responsible for the success of the convention were Ray E. Stevens, president of the Mississippi Oil Scouts and chairman of the convention committee; H. Leroy Francis, Jr., editor of the state publication, and Carlos A. Greer, treasurer of the Mississippi Oil Scouts, together with the 33 members of the state organization.

In his annual address delivered Saturday H. F. King of Continental Oil Company and president of the National Association stated that the organization has a membership of 2000 and had set a goal of 2500 to be attained by 1948 which will be the 25th anniversary of the organization. King was optimistic about the future of the organization which had its small beginnings in Texas, Oklahoma and Louisiana and which now has members in all of the oil-producing states.

Because of the illness of Mississippi's Governor Bailey the convention was welcomed to Jackson by his executive assistant, Jefferson Davis. Leland Spped, Jackson mayor, also spoke.

IPAA Head Speaks

Major B. A. Hardey, president of the IPAA, speaking on "Postwar Oil Industry's Problems," pointed out that because of a wise Congress in previous years, rules and regulations had been laid down which had resulted in a large increase in our petroleum reserves which now amounts to 20 billion barrels. He said that if it had not been for this reserve, the U. S. would have been in bad shape for war.

Hardey was not in favor of any national policy which makes the U. S. dependent upon foreign imports.

"There is a most important problem to be solved since we have only 40 percent of the world's visible reserves and foreign oil can be laid down in the U. S. cheaper than we can produce it with our higher costs," he said. "A federal import policy should be devised to protect domestic producers, and a quota basis for foreign oil should be devised which will permit local industry to take care of domestic needs. It has been predicted that domestic consumption will increase from 4,200,000 to 4,800,000 barrels daily within the next few years."

Another function of the industry, Hardey said, is to preserve resources after they have been discovered and "more attention should be paid to conservation practices." Conservation rules and regulations should be laid down by the state rather than the federal government, he said, pointing out that "it is the duty of the industry to cooperate with the state in conserving resources.

"The industry has a job to perform but it cannot do it under present conditions," he declared. "As a result various petroleum associations have teamed up to have removed all wartime restrictions but groups in government have shown strong resistance."

Hardey was optimistic over the coastal sands of Mississippi, Georgia and Alabama. He also declared that the government should recognize the risks and hazards of the industry and should do things to encourage production.

Mississippi Geology

Clyde W. Alexander of the Dixie Geological Service in a paper on the geology of Mississippi, pointed out that practically all of the state's production is in the salt dome area across the central part of the state. There is now considerable play in the western section in an effort to discover the oil-producing structure which has resulted in the Delhi field in Louisiana. He said that 29 piercement-type salt domes have been discovered in Mississippi and although most of them have been explored, no oil in commercial quantities have been developed.

H. H. Kaveler, of Phillips Petroleum Company, Bartlesville, Okla., said there are 41 cycling plants in the U. S. with a daily average production of 88,200 barrels. There are 250 pools classified as condensate pools. "Cycling plants will become more imperative as the industry becomes better informed on conservation practices," he declared. "Cylcing is an operation which embodies the most modern concepts of conservation. Conservation is accomplished by a clearer understanding of the function of a well and operators are more concerned with production from pools rather than from individual wells."

He also brought out the fact that natural gas is extremely productive of gasoline and other petroleum products. In congratulating the California Company on its construction of the cycling plant in Natchez, he said that more will be built like it as time goes on.

Due to the absence of W. G. Sinclair, editor-in-chief of the yearbook, there was no report made in detail on this but it was announced that it will be more comprehensive than ever although it may not appear until September due to publishing problems.

Moore Field Returned

Oil-bearing lands on which the Navy began construction of Moore airfield in Cleveland County, Oklahoma, in 1943, completion of which was halted when derricks on properties threatened to make operations dangerous, have been sold back to the original owners at the price paid by the government, it was announced last week by War Assets Administration.

The actual out-of-pocket expense to the Navy was $160,081 expended but this was not considered to have increased or decreased the value of the land and was not considered in fixing the price for resale.

Industry Council Waits Justice's Green Signal

Formal organization of the industry council to cooperate with the Interior Department's new Oil and Gas Division was ready to get under way at the week-end, waiting only for the receipt of a formal letter from Attorney General Tom C. Clark, exempting its authorized operations from the anti-trust laws.

The membership list of the council has been on Acting Director Ralph K. Davies' desk for some days, its release held up until the Department of Justice flashed the green light.

For the most part, the new council will be comprised of the men who worked with the government throughout the war as members of PIWC. Representation of the independents has been strengthened, in line with Davies' promise to study the complaints which had been made.

The first meeting of the council probably will be held during the coming month for the purpose of organization and discussion of a program. It has not been disclosed whether, like the PIWC, it will hold periodic sessions or be called to meet from time to time when division officials have matters ready for discussion. The former is seen most likely.

U. S. Crude Reserves Far From Depleted, Declares Knowlton

Declaring that "in spite of the fact that foreign crude oil will be needed to meet the ever-increasing demand of the United States," Don R. Knowlton, former vice president in charge of foreign operations for Phillips Petroleum Company, and now head of the Knowlton Engineering Company, Oklahoma City, said that "the domestic industry is far from 'washed up' and U. S. reserves are far from depletion."

Knowlton, who addressed members of the oil and gas division of the Oklahoma City Chamber of Commerce recently, said needs in the United States industry today are to increase exploration for new reserves, the rehabilitation of old fields, inauguration of secondary recovery programs, and unit operation to permit greater recoveries.

U. S. Steel Buys Plant

United States Steel Corporation was announced last week by the War Assets Corporation as the successful bidder for the $190 million Geneva Steel Plant at Geneva, Utah, for which it offered $47.5 million.

The company is obligated to spend $18.6 million for additional facilities and itself proposed to spend an additional $25 million for a cold reduction plant.

Before the actual transfer takes place, the Justice Department will have to pass on the deal to determine whether it would tend to create a monopoly.

Problems Met in Drilling Abnormal Pressure Formations

By GEORGE E. CANNON and R. S. SULLINS, Humble Oil & Refining Company, Houston

DATA are presented showing the estimated formation pressure in more than 100 wells in Texas and Louisiana where abnormally high formation pressures were encountered.

The most important problems in connection with drilling abnormal pressures are lost returns and planning the most economical mud program. Several possible methods of preventing lost returns are discussed. The method showing the most promise is the use of cement in zones of local weakness. The most important mud treating problems are viscosity control and conservation of weighting material. A centrifugal concentrator can be used not only to conserve weighting material but also as an aid in controlling viscosity by removing undesirable concentrations of clay fractions from the mud system.

Data are presented showing the comparative pump horsepower requirements for an average light mud, that is, 10.3 pounds per gallon and a heavy mud weighing 16.3 pounds per gallon. The comparative carrying capacity of light and heavy muds is also discussed, the heavy mud having considerably more carrying capacity than the light mud. This to some extent offsets the slower circulating rates which are usually obtained with heavy muds.

IN GENERAL, abnormally high formation pressures in Texas and Louisiana are usually encountered in wells drilled along the coast of the Gulf of Mexico, in a belt 35 to 75 miles wide. There are numerous exceptions, however, and abnormally high formation pressures have been encountered in sections of East and West Texas and North Louisiana.

The most credible theory as to the cause for abnormally high pressures over deep-seated domes is the incompetence of formations to bear the overburden without compaction, coupled with a complete or partial seal of the formation. The packing of the formation results in a reduction of volume of fluids carried in the pore spaces and, if there is no escape, there is a consequent increase in pressure. The seal against escape of this pressure may be caused either by deposition or faulting. The conclusion that there must be a seal to trap high pressure seems inescapable; otherwise, the pressure would be dissipated to the outcrop or into zones of normal pressure and thence to the outcrop.

Geographic and Stratigraphic Location and Depth Factors

More than 100 wells drilled to high pressure zones on the Texas and Louisiana Gulf Coast are represented by the data shown on Figure 1. Figure 1 shows three general pressure gradients: (1) Normal pressure gradient of 0.465 pounds per square inch per foot; (2) an earth pressure gradient of 1.0 psi per foot; and (3) a probable maximum pressure gradient in abnormal pressure wells that varies with depth. The data shown represent less than half the wells drilled to abnormal pressure formations in an area extending from Brazoria County, Texas, to Acadia Parish, Louisiana. The majority of the Texas wells in this strip encountered abnormal pressure in the Frio, and in Louisiana in both the Frio and Anahuac formations. In Southwest Texas, a survey showed that a great majority of the abnormal pressure formations have been encountered in the Frio. This is, however, probably caused by the high percentage of wells drilled to the Frio rather than to deeper zones. A study of geological cross sections reveals no particular connection between geological stratigraphic locations and abnormal pressures, the abnormality apparently being a function of depth regardless of geologic age of the formation. High pressures may occur in one area, only a short distance from another area along the strike where the same formations contain normal pressures. Fo rexample, high pressures occur in the Frio sands at 9000 to 10,000 feet at Halls Bayou, Alta Loma, and Dickinson, while these same sands carry normal pressures at depths below 11,000 feet in Red Fish Reef field in Galveston Bay. The difference is attributed, no doubt, to the depositional and faulting characteristics which imprison pressures in one area and permit dissipation in another.

Increasing Mud Weight

Referring again to Figure 1, the maximum gradient shows that abnormal pressures may be expected to be first encountered at 7000 feet and that mud weight may have to be gradually increased to a maximum value at a depth of 10,000 feet. This gradient also indicates that 17.3-pound-per-gallon mud will balance the maximum expected pressure. It may be necessary to use a mud weighing 18 pounds per gallon or heavier to provide an adequate safety factor to allow for gas cutting while drilling and for swabbing tendencies while drill pipe is being hoisted.

The cost of penetrating high pressure formations has been exceedingly high. More money has been spent in discovering and developing high pressure formations than has been realized in production from such formations. There are several producing oil fields and gas-condensate fields in high pressure formations; however, a large majority of the high pressure formations have contained only salt water and its dissolved gas.

Drilling Problems

One method now used in drilling abnormal pressure wells is to set about 3000 feet of 13⅜-inch casing, drill to approximately 10,000 feet, or less if high pressure prevents obtaining this depth, and set 9⅝-inch casing. The hole is then drilled to the projected depth if no heavier than 17-pound-per-gallon mud is necessary to counteract the formation pressure. As the necessary mud weight approaches the overburden weight, the chances of lost returns are increased immensely. Many wells have been abandoned before reaching the desired depth because of the extremely close balance frequently required between back flow and lost returns. It is questionable whether additional strings of casing set to increasingly greater depths will be of any appreciable benefit in stopping lost returns where mud weights closely approaching the over-

Presented at the spring meeting of the Southwestern District API Division of Production, Shreveport, May 17-18, 1946.

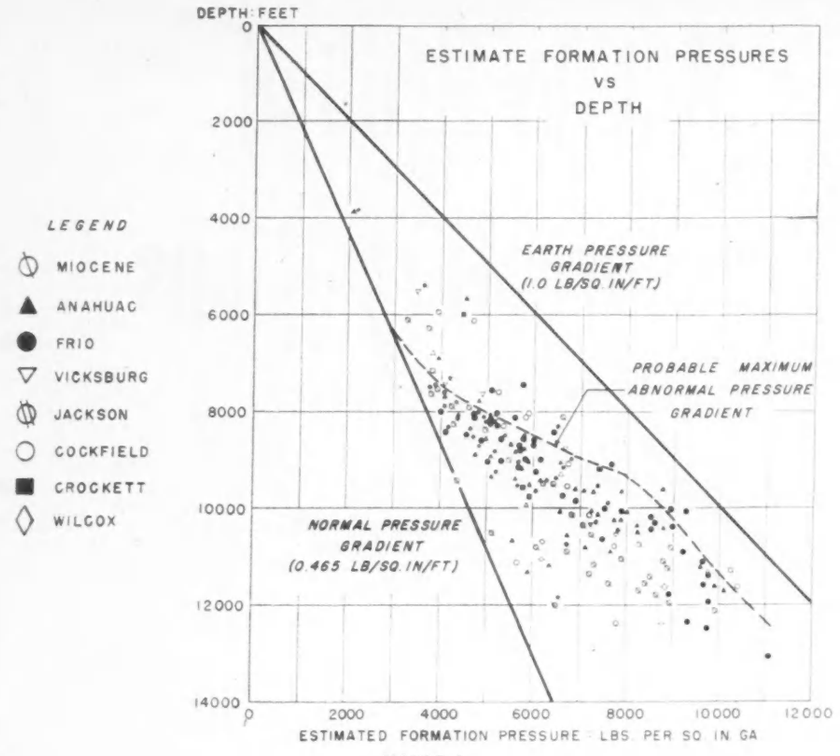


FIGURE 1

burden weight are being employed. However, it is believed that the adoption of such a program on several wells would be justified on a trial basis to determine the merits of such a casing program. Sealing agents, such as cane pulp and chopped cellophane, have been widely used to combat lost returns of normal weight mud when extremely porous formations, such as gravel beds, are being penetrated. The use of bulky material with high weight muds to combat lost returns has been limited and the results obtained have been far from satisfactory. The mechanics of lost returns in the two cases mentioned are somewhat different. The extremely porous formation receives mud into the large pore spaces and fissures already existing, whereas the relatively heavy mud opens its own horizontal fissures in the bedding plane between formation or other zones of local weakness, because the extreme pressure applied by the heavy mud lifts the overburden and permits the mud to enter the fissure formed, in much the same manner cement enters in a squeeze-cementing job. The application of cement to zones of local weakness has been very successful in regaining lost circulation where heavy muds are employed. In some wells, however, it is difficult to determine the exact position to place the cement.

Friction Loss

One important fact stands out in most of the heavy mud jobs where returns are lost. If the viscosity is low and circulation is at a very slow rate, it is usually possible to maintain circulation. This indicates that the friction lost in the annulus between drill pipe and hole is considerably larger than has been expected and is a subject that deserves considerable attention by research groups.

The problem of obtaining relatively high weight muds is not serious. In most cases the cost of maintaining a high weight mud over long periods is considerably greater than the initial cost of preparation. This is particularly true where abnormally high formation pressures are encountered in formations that make considerable mud. In most wells it is the practice to discard the extra mud from the slush pit. Figure 2 shows a centrifugal concentrator that can be use to separate the heavy weighting material from the clay, before the clay fraction is discarded. The routine use of a centrifugal concentrator in connection with high weight muds will result in a saving of three to five tons of weighting material a day.

The abnormal pressure data accumulated indicate a mud weighing slightly more than 18 pounds per gallon will be sufficient to control the pressures encountered in Texas and Louisiana. This weight can be obtained with barites and iron oxide weighting materials. Should drilling conditions change and it is found that muds weighing in excess of 18 pounds are required, a ferro-phosphate compound is available that may be used to obtain satisfactory mud weights as high as 20 to 22 pounds per gallon. Past experience with lost returns indicates, however, that in most wells we will be unable to maintain circulation when such high mud weights are employed.

Viscosity Control

Viscosity control of high weight muds is considerably more complicated and expensive than where normal mud weights are employed. Abnormal pressures are encountered in the deeper horizons where the formation temperatures may be in excess of 200°F. At such temperatures, some of the viscosity reducing agents such as the complex phosphates are very unstable and the viscosity reduction obtained by their use is temporary, and in some wells the temperature is so high that even a temporary reduction cannot be obtained.

Laboratory as well as field data show that the viscosity reduction obtained with alkaline-tannate solutions is more stable to high temperature effects than is the reduction obtained with the complex phosphates now in common use.

As pointed out above, a high percentage of the abnormally high pressure formations contains salt water. This salt water, if allowed to mix with the mud, increases the difficulties of treating to reduce viscosity. The use of the centrifugal concentrator as a combination concentrator and elutriator has proved to be a satisfactory method for removing soluble salts from drilling muds.

The formations which make mud contribute to high viscosity trouble. As the clay concentration and percentage of solids increase, the benefits obtained from viscosity reducing agents decrease. A centrifugal concentrator has proven very useful not only in conserving barites but also in reducing the mud treating cost. The amount of water which must be added each day when drilling in formations that make mud,

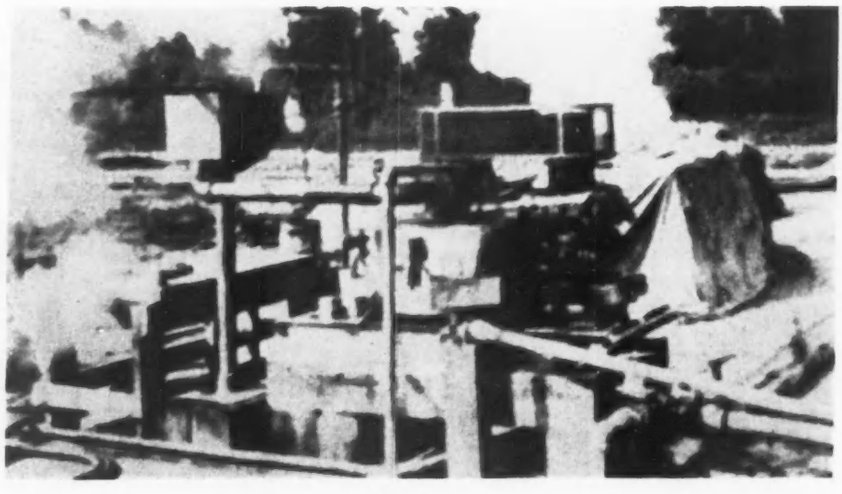


FIGURE 2
Centrifugal Concentrator

and the consequent barites necessary, can be reduced by removing the clay with the centrifugal concentrator or maintaining at any desired concentration.

Frequently in connection with drilling abnormally high formation pressures, it is desirable to reduce the filtration rate of the mud by the addition of starches and vegetable gums. The addition of these materials usually increases the viscosity of the mud. In some cases, the mud is maintained at a relatively high pH to prevent fermentation of the additive. With some muds the maintenance of a high pH value may contribute to high viscosity. Tests on several wells have shown that the use of lime or cement will aid considerably in controlling the viscosity without impairing the filtration rate of the mud. These calcium compounds can also be used in connection with germicides.

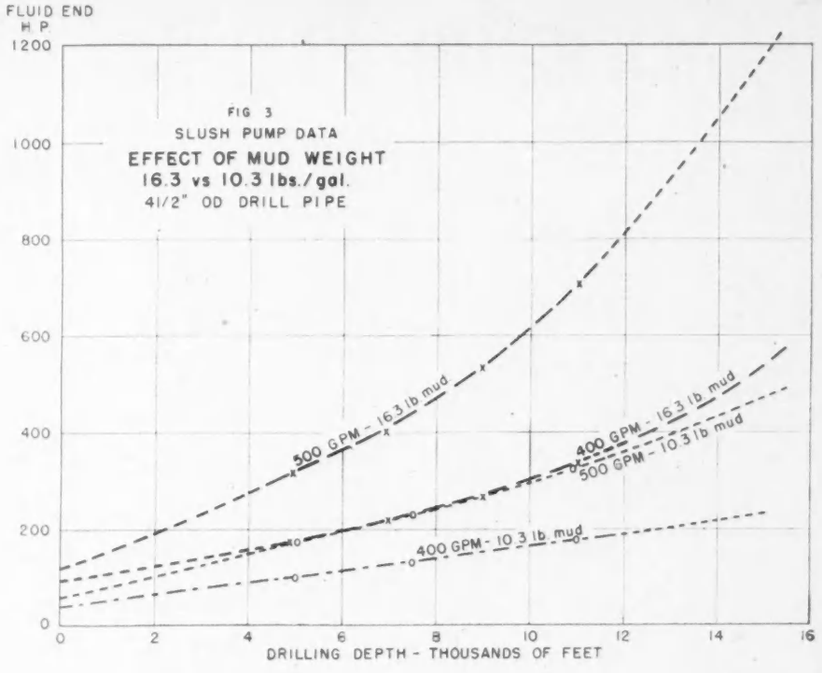
Horsepower Required

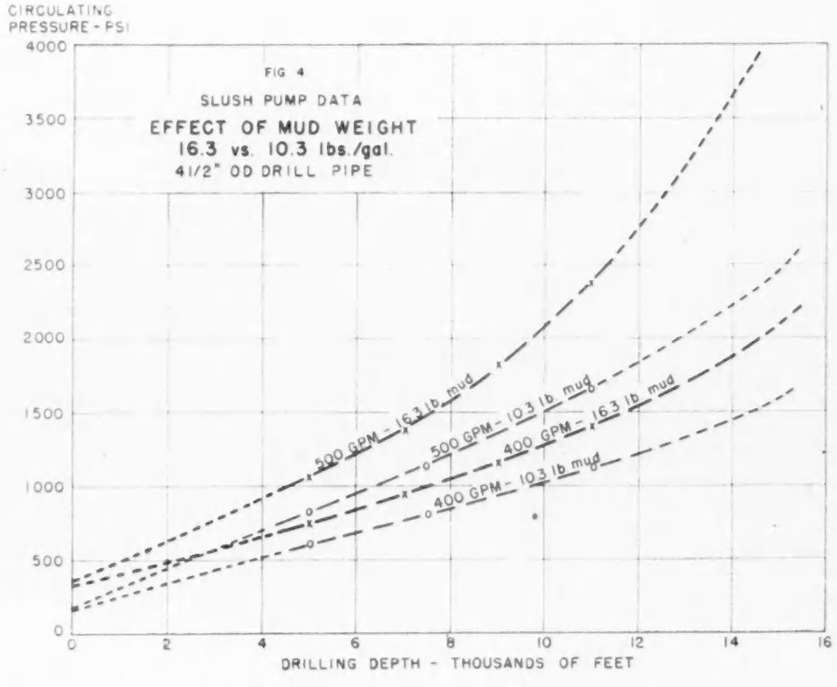
Field tests have shown that where drag bits are employed, the rate of drilling is roughly proportional to the rate of circulation within the limits of present day equipment. The maintenance of comparatively high circulating rates using high weight muds requires considerably more horsepower than is required for circulating normal weight muds. Figures 3 and 4 show the comparative horsepower requirements and pump pressures involved in circulating muds weighing 10.3 and 16.3 pounds per gallon, respectively, through 4½-inch outside diameter drill pipe. It is noted that practically the same amount of fluid horsepower is required to circulate the 16.3-pound-per-gallon mud at a rate of 400 gallons per minute as is required to circulate the 10.3-pound-per-gallon mud at a rate of 500 gallons per minute. An extrapolation of the 500-gallon-per-minute curve for the heavy mud indicates that approximately 1200 fluid end horsepower would be required to circulate 500 gallons per minute at a depth of 15,000 feet.

As previously mentioned, it is oftentimes impossible to maintain comparatively high rates of circulation when high weight muds are employed, because of lost returns. Fortunately, however, as mud density is increased, there is a reduction in the mud velocity required for removing cuttings. According to Stokes Law:

$$V = \frac{2gd^2}{36} \frac{(P1 - P2)}{u}$$

where V = slip velocity of cuttings, feet per second
d = diameter or greatest dimension of particle, inches
P1 = density of cuttings, pounds per cubic foot
P2 = density of mud used, pounds per cubic foot
and u = apparent viscosity of mud (Reynolds — 0.000672 x centipoise viscosity)





It can be seen that the slip velocity will vary directly as the difference in weight of cuttings and mud and inversely as the viscosity u. Thus, the mud velocity needed to remove cuttings will be reduced in proportion to the increase in mud weight and to the increase in viscosity. An increase in mud weight of from ten to 16 pounds per gallon will reduce the slip velocity to 29 percent of that of a ten-pound-per-gallon mud. This is considering only the change in density, and the actual viscosity of the weighted mud will be much higher than the viscosity of the original mud, which will result in the slippage being further reduced. Doubling the viscosity will cut the slip velocity in half.

Conclusions

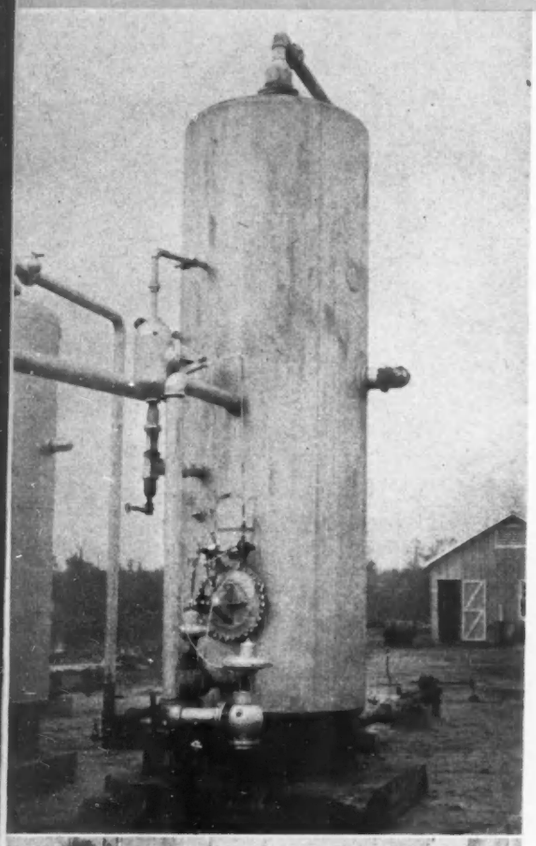
The most important problem in connection with the drilling of abnormally high formation pressures is the prevention of lost returns. Methods that can be successfully employed in one area may not be applicable in another; however, several possible solutions to the problem are presented which are as follows:

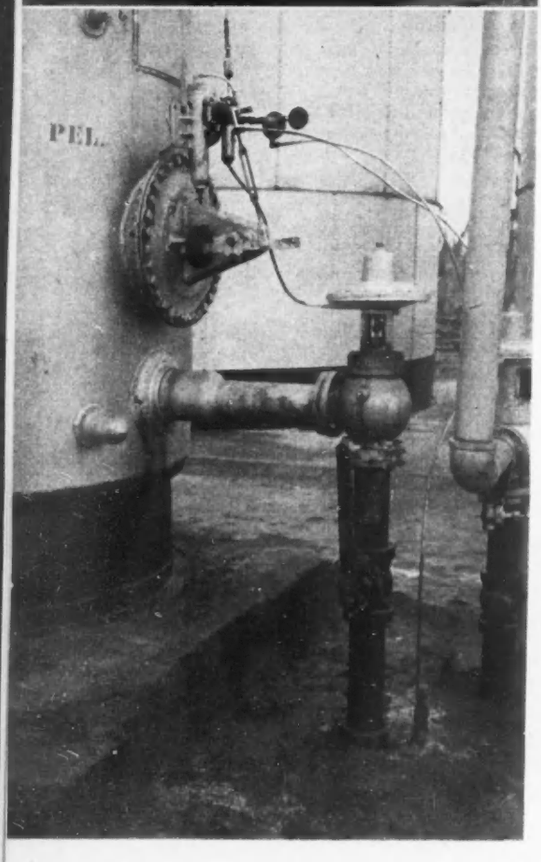
1. Careful control of the circulating rate. This also involves careful control of mud weight.
2. The use of very deep protective strings of casing.
3. Cementing zones of local weakness.
4. Use of sealing agents.

Controlling the physical and chemical properties of a relatively high weight mud is complicated and more expensive than when dealing with normal mud weights. Methods are available for obtaining almost any desirable mud property. Careful planning of the mud program and the use of every available means for conserving materials will result in a considerable reduction in mud costs, as well as more efficient operations.

Separator Pressure Used for Salt

By GORDON B. NICHOLSON, Staff Writer





IN THE Gibson field of Terebonne Parish, Louisiana, Shell Oil Company uses knockouts converted from separators for removing all the water possible from the production, employing a closed disposal system which utilizes knockout presures for injecting the water into input wells. A relatively small percentage of emulsified water remains with the production after leaving the knockouts, and only this portion is directed through the gunbarrels and heating system with the oil for treatment.

Removal of 85 to 90 percent of the water by the knockouts lessens corrosive reactions in the lines and treaters, and replacement of equipment and removal of scale from the lines has diminished to a negligible factor since the system was installed. With the bulk of the water retained inside a closed system without opportunity for aeration, the principal oxidizing elements are absent, with a consequent reduction in formation of oxides and other precipitates in the injection water. With precipitation held to a negligible factor, the deposit of solids on the faces of the receiving formations is also minimized, and frequent backwashing of input wells is unnecesary, although each input well is equipped with the necessary apparatus and attachments for this procedure.

Since the discovery of the Gibson field in 1937 and the subsequent finding of the contiguous Northeast Gibson field in 1941, wells have produced an increasing amount of salt water until now approximately 25,500 barrels daily are withdrawn from the two sections of the field. One disposal well serves the Northeast Gibson field which totals about 4500 barrels of salt water daily from 14 wells. The old field, located in the swamps on the south side of U. S. Highway 90, has 28 wells and each day produces approximately 21,000 barrels which are injected into two input wells.

Regular production in the Gibson and Northeast Gibson fields is obtained from multiple sand formations ranging in depth from 9000 to 10,400 feet, although no wells are completed in more than a single formation. Shallow sands are utilized for receiving the salt water, depth of the input well in Northeast Gibson being 1300 feet, while the disposal wells in the old field are completed in formations 600 to 700 feet deep. One of the Gibson field disposal wells was originally the first dry hole drilled in the field, having been plugged back later to its present depth.

Top photo, converted separators are used as water knockouts and remove 85 percent to 90 percent of the water produced at Gibson. The knockouts operate with 60 pounds pressure which is also used for injecting water into the shallow formation. The closed system minimizes formation of solids and line-scaling.

Lower photo, each knockout is equipped with automatic controls for regulating withdrawal of water, aided by an external glass gauge which shows level of oil/water contact. Oil and emulsions removed from upper levels are conducted to gunbarrels.

Little Pressure Needed

Water produced from both sections of the field is handled alike, although no pressure is required for injection into the receiving well in Northeast Gibson. Disposal in the old Gibson field is effected with little pressure, working pressures in the knockouts being utilized for this purpose and providing sufficient force to direct water from the knockouts into the disposal wells without the necessity of installing pumps. The relatively small volume removed by heating requires the service of a pump for transfer from the evaporating pit to the casing of the input well where it is injected into the formation under 30 pounds pressure.

Fluid from all wells is conducted from the respective Christmas trees to conventional separators for extraction of free gas, afterwards being conveyed to the water knockouts nearby. Ordinary separators serve as water knockouts, employing several modifications designed to facilitate settling of water from the fluid, with special provisions for accumulation of water at the bottom and oil and emulsions at the top. External glass gauges are placed conveniently on the sides of the knockouts to permit easy determination of point of water-oil contact, and a four-inch outlet is placed below this level for withdrawing the water. A valve automatically controls movement of water into the outlet, and oil and emulsions are removed through another pipe located higher on the knockout.

Water from the knockouts is conducted through four-inch lines which expand into six-inch after converging with the discharge lines from other knockouts. These lines carry the water directly to the casings of the input wells.

The input well in Northeast Gibson receives its water without pressure, and the weight of the hydrostatic head of fluid in the casing is ample for injection purposes. In the old Gibson field, one of the two input wells handles the water from knockouts, and accommodates all the water removed under the normal 60 pounds working pressure, which is sufficient to force water into the receiving formation. The other input well is reserved for water removed during treating.

Water contained in emulsion form is conducted from the knockouts to gunbarrels and treated at temperatures of 105 to 125° F. by circulating through heaters. As water breaks out of emulsion and settles, it is drained from the bottoms of the gunbarrels and flows by gravitation to the area where the disposal wells are located.

Prior to injecting the treated water into the wells, another opportunity is

Water Disposal

allowed for removal of oil and gas which appears after the fluid has cooled. This is accomplished by flowing through another knockout which allows time for loss of treating temperatures. Oil forms on the surface and is later gathered and transferred into the stock tanks. The water in Northeast Gibson is conducted from the knockouts into the casing of the input well, flowing by gravity, while in the old Gibson field, the water drained from the knockouts gravitates to a large evaporating pit.

A pumphouse near the pit contains a centrifugal pump of 30,000 barrels daily capacity and motivated by an engine operating on field gas. Water is pumped through an eight-inch suction from the pit and into the casing of the second input well at 30 pounds pressure. Valves on lines going to both wells permit directing the water to either well as desired, but the free water from the knockouts and the treated water from the gunbarrels are not mixed, and are injected into individual wells.

One well used for water disposal was the original dry hole drilled in the Gibson field, while the other two were drilled especially for disposal. Both Gibson wells have 10¾-inch casing set through the receiving formation, one also having seven-inch liner inside the casing. The Northeast Gibson well was completed with seven-inch casing. Casing of all three wells is perforated liberally in the areas opposite the receiving formations.

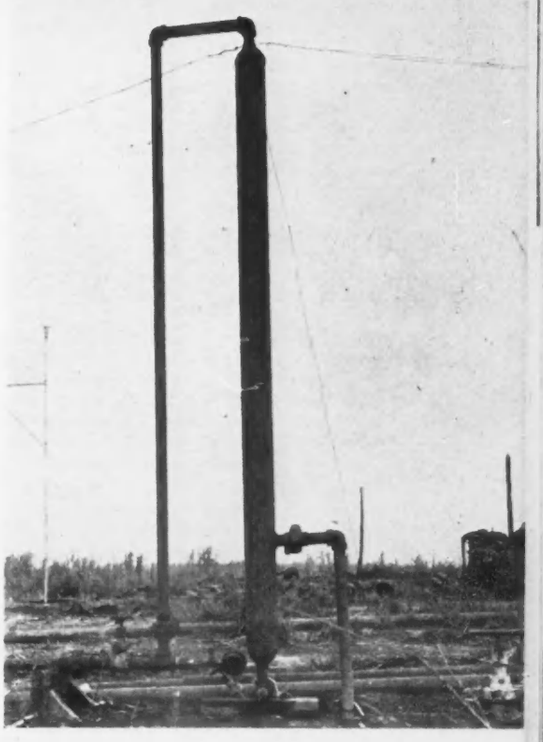
Each well is equipped with two-inch tubing extending nearly to bottom, and surface connections join a gas line for backwashing the wells. Gas under pressure is admitted into the tubing for backwash, and lifts fluid through the casing, its effectiveness demonstrated by a sizeable accumulation of sand on the ground near the casingheads, which is the product of past cleanings.

Gas for lifting fluid is obtained by means of a lubricator which removes free gas under pressure from the flow line of one of the producing wells. The lubricator is made from a 12-foot joint of six-inch pipe mounted in vertical position as an accumulating chamber, with both ends sealed. A two-inch pipe extends longitudinally through the accumulator and is weld-sealed through the ends. The two-inch pipe is blank inside the chamber, except for sections near the top and bottom which are perforated, providing top and bottom inter-connections between the inside pipe and the chamber. A two-inch nipple is welded into the wall of the accumulator at a point about three feet from bottom and serves as connection for the flow line from the well. Extensions are attached to both ends of the central two-inch pipe, provided with suitable connections for a gas line designed to conduct gas from the top of the lubricator to its ultimate destination, and a line from the bottom of the lubricator for carrying fluid to the separators and tank batteries.

Production from each well connected with a lubricator is directed into the central portion of the accumulating chamber through the two-inch fitting provided for a flow line attachment. Velocity decreases inside the enlarged chamber, allowing fluid to settle to bottom, where it flows through the perforations in the interior two-inch pipe and out the bottom of the accumulator. Gas, rising to the top, flows through the upper set of perforations and into the gas line provided at the top of the lubricator. The device is tested for 3000 pounds pressure, although under normal working conditions a pressure of approximately 800 pounds is maintained in the line, this reading being obtained by means of a pressure gauge which is mounted on the gas line.

Lubricators of this description are located in both the new and the old sections of the field, and two-inch lines are extended to conduct gas to the tubing of the three disposal wells for backwashing. Lines are also available to carry the gas to the other wells in the field, furnishing pressure and supply for gas lifting some of the producing wells when not being used for backwashing.

Shell's closed system for salt water disposal has operated for more than a year and a half, and compares advantageously with the method formerly used on both a cost and maintenance basis. Lines have not scaled since the system was first inaugurated, although scaling previously ocurred on an average of once every four to six months, the drop attributed to the reduced volume of salt water passing through the lines, gunbarrels, and heaters. Reduction of salt water volume also alleviates work demanded of the gunbarrels, and simultaneously lessens treating costs by removing bulk of the water prior to treating.



Top photo, water removed by heating is conducted to another knockout to permit separation of oil and gas which appear after the fluid cools. Water then flows to pit from where it is transferred to disposal well by means of a centrifugal pump with 30,000-barrel daily capacity.

Center photo, an eight-inch line conducts water to the casing of an input well in the old Gibson field. Each input well is also equipped with two-inch tubing which extends nearly to bottom, and field gas is available for backwashing

Lower photo, gas for backwashing formation is obtained from flow line of a well by means of a lubricator into which the flow is directed. An internal two-inch pipe runs longitudinally through the accumulating chamber, its upper and lower sections having perforations for extracting gas and fluid, respectively.

Mathematics of Cementing Problems

Part 1

By ROY E. EDWARDS, Halliburton Oil Well Cementing Company

ALTHOUGH this series of brief and fundamental engineering articles will deal primarily with problems of oil well cementing, it also will deal with some of the problems frequently encountered in the oil and gas fields. During an extended period of time spent in the oil fields the writer not infrequently met field men who frankly admitted that they were not familiar with, or had forgotten, certain fundamental principles of mathematics essential in the efficient performance of their work.

It cannot be denied that such a lack of knowledge is a serious handicap not only to the men in the field but to many operators who spend most of their time dealing with the economics of their business and leave the calculations, mathematics and equations to others who may not be competent to come up with the correct answers. In the long run this attitude will result in difficulties and financial losses. In practically all phases of oil and gas operations some knowledge of mathematics and engineering principles is necessary and it is to fill this need that the writer ventures to present this abbreviated "refresher" course in cementing and oil field mathematics.

In every business transaction the percentage factor is present. It is an indispensable part of engineering. All comparisons of values or quantities are expressed in hundreds, or the Latin equivalent—percent. When the percent sign is used it takes the place of the decimal point, or it is equivalent to moving the decimal point two places to the right. To change a decimal to a rate percent move the decimal point two places to the right and annex the percent sign, and conversely. To change a rate percent to a decimal remove the percent sign and move the point two places to the left. Elementary, yes, but the writer too frequently has noted that even this fundamental principle, when not clearly understood, will cause considerable confusion.

In cementing and acidizing the field man and engineer are chiefly concerned with the percent by weight, or the percent by volume. When we have a certain percentage of solution we should be careful to state whether or not this percentage is by weight or by volume.

Example: We are mixing a salt solution for the purpose of mixing cement. For each gallon of water we are adding one half pound of salt. What percent solution is this, neglecting the increase in volume due to adding the salt?

Solution: One gallon of water weighs 8.33 pounds; hence the total weight is $8.33 + 0.5 = 8.83$. Then $0.5/8.33 \times 100 = 5.63$ percent.

In dealing with salt solutions the percentage should be expressed as a percentage by weight.

Acid strengths are expressed either by weight or percent by volume. When speaking of acids we must be sure to differentiate, as any one not knowing the difference might be confused.

Below is a table of values for salt solutions for cementing work. These values will change with temperature but they are sufficiently accurate for present purposes.

Percent of Salt	Lbs. of Salt/Gal.	Specific Gravity
1	0.0839	1.0053
2	0.1690	1.0125
4	0.3428	1.0268
6	0.5214	1.0413
8	0.7049	1.0559
10	0.8935	1.0707
12	1.087	1.0857
14	1.286	1.1009
16	1.490	1.1162

Square Roots

We call any number R a square root of A if $R^2 = A$. In other words, A is the number obtained by multiplying R by itself once. For example, three squared is nine and the square root of nine is three.

As an example, to find the square root of 1489.96 the solution is as follows:

```
        14'89'.96 = 38.6
         9
* 68     589       * 2 × 3 =   6
          544        60 + 8 =  68
           45.96     2 × 38 =  76
766        45.96     760 + 6 = 766
```

Note that the figure to the right of the decimal is marked off in "periods" of two numbers. To begin, we take the largest square in the first period, in this case nine, whose square root is three. We square the 3 and subtract it from the first "period" (14) and bring the next period (89) down; then we take the square root 3 and multiply it by 2. Multiplying the 6 by 10 and dividing the result into the number we have brought down (589) we find that the 60 will go into the (589) eight times, adding the 8 to the 60 we get 68; and taking the product of 8 and 68 we subtract the result from 589. A part of the root we are now trying to find is now 38. From this point on the process is as shown in the example.

Beginning a four-part refresher series on basic mathematical problems often met in normal drilling

A knowledge of the foregoing is important in that it enables one to find the side of a square if the area of the circle is known.

We may represent numbers by letters, as in algebra. Usually numbers of known values are represented by letters from the first part of the alphabet and unknown quantities by letters at the end of the alphabet. The only restriction on the choice of letters is that no single letter be made to represent two different numbers at the same time. In oil well cementing work the majority of the algebraic equations encountered are simple.

Herewith is set forth a few fundamental rules that will aid in the following equations that are later developed.

(1) The same number may be added to both sides of an equation without destroying the equality.

$$a + b = c + d$$
$$a + b + m = c + d + m$$

(2) The same number may be subtracted from both sides of an equation wtihout destroying the equality.

$$a + b - m = c + d - m$$

(3) Both sides of an equation may be multiplied by the same number without destroying the equality.

$$H(a + b) = H(c + d)$$

(4) Both sides of an equation may be divided by the same number without destroying the equality.

$$(a + b) \div h = (c + d) \div h$$

In algebraic operations we have negative and positive numbers and these numbers are denoted by the following signs: (+) positive; (—) negative. A positive number multiplied by a negative number gives a negative product ($-a \times b = -ab$). The product of two negative numbers is positive ($-a \times -b = ab$. In division if either number is negative the result will be negative: $-a \div b = -a/b$) or ($a \div -b = -a/b$).

A very useful and labor saving device in algebra is known as factoring. This

And Other

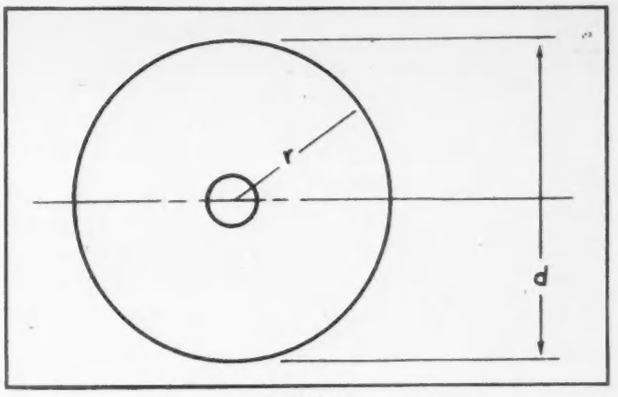


FIGURE 1

is illustrated in the following examples. Note the operation of the signs:

(1) $c-(ax-bx)=yd$
$c-[-x(a-b)]=yd$
$cx(a-b)=yd$

(2) $c+x(am+bm)=zd$
$c+xm(a+b)=zd$

We may collect a group of numbers, any letter or number may be factored if each of the other numbers in the group are multiplied by it.

Thus $ay+by-cy=md$
$y(a+b-c)=md$

When letters or numbers are enclosed in brackets or parenthesis, or both, as shown in the following example, we must begin removing the inner parenthesis first:

(1) $a[b+z(c+d)]=w$
$a[b+zc+zd]=w$
$ab+zac+zad=w$

(2)
$a[b+z(c+d)]=n[e+w(f-g)]$
$a[b+zc+zd]=[e+wf-wg]$
$ab+zac+zad=ne+wnf-wng$

Areas and Volumes

In cementing work and acidizing the operator is mainly concerned with the areas of circles, squares and rectangles used in computing volumes of rectangular and cylindrical containers. Some rounded tanks are smaller at the top than at the bottom; that is, the sides have a slight slope, this being the form of a truncated cone.

(1) Areas: The area of a rectangle or square is equal to the length of the base times the length of the side or in other words it is the product of the two sides.

The area of a circle is equal to πr^2 where π is a constant value equal to 3.1416 and r^2 means that the radius of the circle is multiplied by itself once or is $r \times r$. The area of a circle may also be written as $\pi d^2/4$. The value (π) is the ratio of the circumference to the diameter of any circle.

Shown as Figure 1 is a circle of which the radius is shown as r and the diameter d. The radius is the distance from the center of the circle to the circumference. The diameter is equal to twice the radius or $2r = d$. Hence the area of a circle is equal to $\pi \frac{d^2}{2}$ or $\pi \frac{d^2}{4}$.

Figure 2 shows two concentric circles, that is, they have a common center. This is the condition we have to assume exists in a well when the outer circle represents the wall of the hole or the outer string of pipe, and the inner circle represents the outer wall of the inside string of pipe or the pipe in the hole.

(2) Volumes: To determine the volume of any tank, container, or solid having a rectangular base, it is necessary to multiply the area of the base by the height of the container. The volume of the tank in Figure 3 is therefore $a \times b \times c$. The same rule applies to cylindrical containers. For example, a joint of pipe may be considered as a cylindrical container hence, the volume of a cylinder is $\frac{\pi d^2}{4} \times h$. (Figure 4). If the cylinder had another cylinder setting exactly in the center of the outer cylinder—as in the case of two strings of casing—and it is desired to find the volume between the inner and outer wall, we could calculate the volume of the outer cylinder and the volume of the inner cylinder then take the difference, but, as shown under the discussion on areas, the base of this annular volume is an annular area and may be computed as follows:

$$\text{Area} = \frac{\pi D^2}{4} - \frac{\pi d^2}{4} = \frac{\pi}{4}(D^2 - d^2)$$

The volume above this area is equal to the height, depth, multiplied by the area.

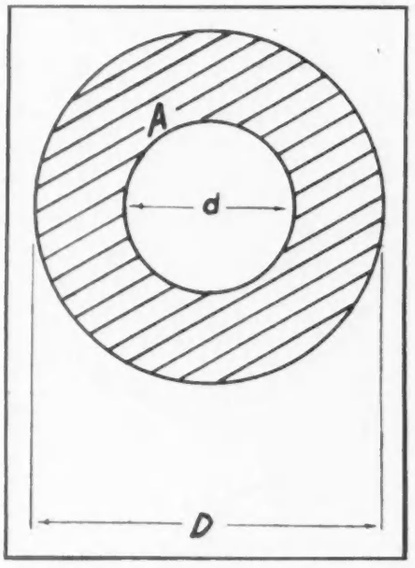


FIGURE 2

Hence:

$$\text{Volume} = Ah = h \times \frac{\pi}{4}(D^2 - d^2)$$

Examples of Rules

The following examples illustrate rules which must be applied in solving many every-day problems that confront field men:

(1) The dimensions of one side of a tank (Figure 4) are 78 x 30 x 30½ inches and it is desired to find the volume in barrels and the volume in barrels per inch of depth:

Solution:

Volume $= a \times b \times c = 78 \times 30 \times 30.5$
$= 64370$ cubic inches
One cubic foot = 1728 cubic inches
One cubic foot = 0.1781 barrels.

Hence: Volume in barrels $= \frac{64370}{1728} \times 0.1781 = 6.62$ barrels.

Volume per inch of depth =
$6.62/30.5 = 0.217$ barrels

If one inch = 0.217 barrels then
$1/0.217 = 4.6$ inches/barrel.

(2) What is the capacity of a circular tank 15 feet in diameter and eight feet high?

Solution:

Volume $= Ah \frac{\pi}{4} \times 15^2 \times 8 \times 0.1781$
$= 252$ barrels.

Volume per inch of depth $= \frac{252}{12 \times 8}$
$= 2.62$ barrels/inch.

(3) What is the volume of 100 feet of 2½-inch upset tubing?

Solution:

Volume $= Ah \frac{\pi}{4} \frac{(2.441)^2}{(12)} \times 100$
$= 3.24$ cubic feet $= 3.24 \times 0.1781$
$= 0.577$ barrels.

(4) How many sacks of cement will it take to plug back ten feet in 8¾-inch hole assuming that one sack equals 1.1 cubic feet:

Solution:

Volume $= \frac{\pi}{4} \times \frac{(8.75)^2}{(12)} \times 10$
$= 4.17$ cubic feet $= 4.17/1.1$
$= 3.80$ sacks

(Some additional cement might be

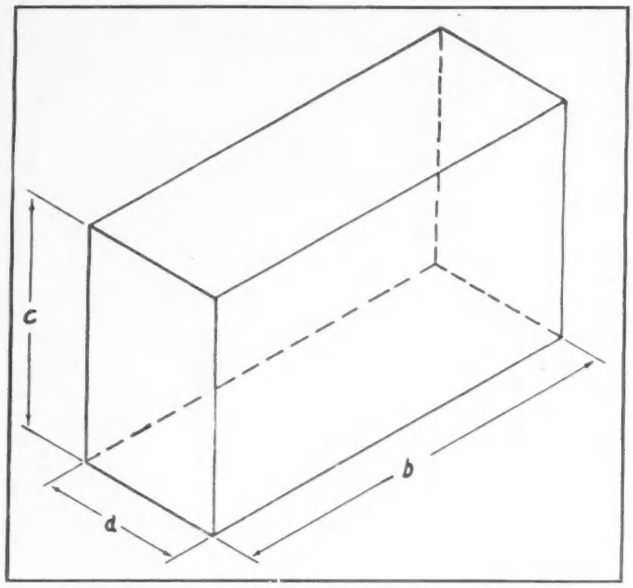


FIGURE 3

added depending on experience of the field man in the particular locality and to take care of contamination.)

(5) How much fluid must be pumped to displace 2050 feet of 2½-inch upset tubing, assuming that ten sacks of cement are being run to plug back ten feet in 6¼-inch hole?

Solution:

First, the tubing is pulled up to 2040 feet. Two feet are allowed for the velocity effect of the fluid at the end of the tubing. Hence there will be 2038 feet of tubing to displace. Volume $= \frac{\pi d^2}{4} \times L$

$= \frac{2.144^2 \times 0.785}{144} \times 2038 =$

51.0 cubic feet. 1 barrel = 5.6 cubic feet = 9.1 barrels.

(6) What is the volume between 8¾-inch hole and 7-inch casing at depth of 100 feet and how many sacks of cement will it take to fill this volume?

Solution:

$$\text{Volume} = L \times \frac{\pi}{4} (D^2 - d^2)$$

$$= 100 \times 0.785 \frac{(8.75^2 - 7^2)}{144}$$

= 15 cubic feet.

One sack = 1.1 cubic feet, 15/1.1 = 13.65 or 14 sacks.

(7) What is the volumetric capacity of a gaso pump having 4-inch liners and turning 90 revolutions per minute, stroke being 10 inches?

Solution:

(Assume an efficiency of 70%.) The volume pumped per cylinder per stroke is $0.70 \times \frac{\pi d^2}{4} \times L =$ Volume. Where L is the stroke $0.70 \times \frac{\pi 4^2}{4} \times 10 = 7 \times 4\pi$ $= 28\pi$ cubic inches. For each revolution there are two strokes of the piston, hence: $2 \times 28\pi \times 90 = 5040\pi$ cubic inches. One cubic foot = 1728 cubic inches; one barrel = 5.6 cubic feet; $\frac{5040\pi}{1728}$ = 9.15 cubic feet. This is for one cylinder only. Therefore $\frac{9.15 \times 2}{5.6} = 3.27$ barrels/minute; $3.27 \times 60 = 196$ barrels /hour.

(8) Let us assume that we have 3500 feet of seven-inch, 24-pound casing with a float collar one joint off bottom and desire to leave 10 feet of cement above the float collar, how long will it take to pump the plug down with a 14" x 7¼" x 18" slush pump running at 40 revolutions per minute?

Solution:

Total pipe to be displaced equals $3500 - (30 + 10) = 3460$ feet. The volume of 3460 feet of seven-inch, 24-pound casing is $3460 \times 0.21 = 758$ cubic feet.

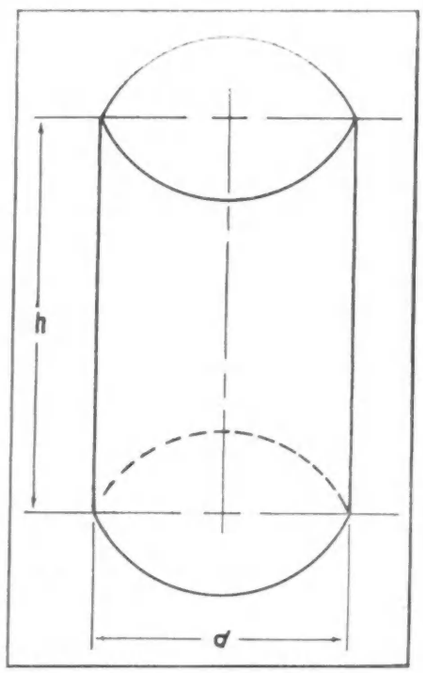


FIGURE 4

Volume pumped per stroke is

$V = 7.25^2 \times \frac{\pi}{4} \times 18 = 740$ cubic inches.

There are two cylinders and two strokes per revolution. Hence $\frac{740 \times 4}{1728}$ = 1.7 cubic feet. At 40 revolutions per minute $1.7 \times 40 = 68.0$ cubic feet/minute. Therefore $\frac{758}{68 \times 0.70} = 16$ minutes.

(9) We assume that we are working on a well 5749 feet deep with a cement retainer set at 5730 feet in 9⅝-inch casing. The retainer is run on 2½-inch tubing and 100 sacks of cement are to be used. At the instant the pumps are shut down and circulation jars open to wash out the excess cement 25 barrels of water had been forced in behind the 100 sacks of cement. How many sacks of cement were forced in to the formation below the retainer?

Solution:

Volume of tubing $= 2.44^2 \times \frac{\pi}{4} \times$ 5730 = 186 cubic feet = 186/5.6 = 33.2 barrels. Then 33.2 — 25 = 8.2 barrels occupied by the cement above the retainer. $8.2 \times 5.6 = 45.9$ cubic feet; 45.9/1.1 = 41.7 sacks in the tubing, or 100 — 41.7 = 58.3 sacks into the formation. Actually, there may be only 38.4 sacks in the tubing because a shrinkage factor of about 0.1 cubic foot has not been allowed for but the above value is close enough for practical purposes.

(This is the first of four articles. The second will appear next week.)

Humble Production Department Personnel Changes Are Made

D. W. Wofford, district superintendent, Roanoke District, Louisiana Division, retired April 22 after 25 years with Humble Oil & Refining Company. Wofford joined Humble in 1917 in the old Goose Creek field during its boom days. He was promoted to field manager and supervised 13 drilling rigs at night, mostly on foot, wagon, and horseback. He began his present continuous service in 1921 as a derrickman and was promoted to night superintendent shortly. From Goose Creek his work carried him to Corsicana, Powell, and Wortham fields, and then to Smackover, Ark., in 1925, and later to Cotton Valley in the old Louisiana Division with headquarters in Shreveport. After spending several years in Louisiana at various locations, he returned to East Texas for part of the boom, and back to Louisiana via Greens Lake District in the Gulf Coast Division, then to Roanoke in 1933.

Joel C. Ott, district superintendent of the Bayou des Glaise District, Maringouin, La., was transferred to the Roanoke District.

Floyd L. Lively was promoted to district superintendent of the Bayou des Glaise District.

James H. McReynolds, Jr., has returned to Humble after having been on military leave of absence since March, 1942, and has been reassigned to work in the reservoir engineering section of the Petroleum Engineering Division, Houston office.

Jack S. Toler, district civil engineer, Darrow District, Geismar, La., was transferred to the London District at Overton.

Use of Oil-Base Mud

At Elk Hills Naval Petroleum Reserve 1

By R. W. STUART, Stanolind Oil & Gas Company, Tulsa

DURING the wartime development of Elk Hills Naval Petroleum Reserve No. 1 a program was initiated for obtaining comprehensive reservoir data. The first step in this program was the selection of representative welsl throughout the field for coring the producing sands. Since the field was badly faulted and there were numerous producing sands, it was necessary to core a large number of wells.

The first coring was done with natural water base muds. Approximately 50 wells were cored, utilizing muds of the lowest possible fluid loss. The resulting core analysis data were very erratic, indicating a large amount of flushing from the mud. The saturation and salinity inconsistencies in these data gave doubtful values for estimating reserves.

Due to this undesirable flushing, it was decided to use low fluid loss starch muds and approximately 30 wells throughout the field were cored with such muds, having fluid losses of one to two cc. by the API method. The resulting core analyses showed more than the permissible amount of flushing.

After consulting the Bureau of Mines on their methods of obtaining the most accurate core analyses, it was decided to core with oil base mud. Approximately 15 wells were cored through the producing sands with oil base mud and excellent core recovery was experienced. In order to obtain accurate checks on the cores drilled with oil base muds, the Bureau of Mines moved in a core analysis laboratory.

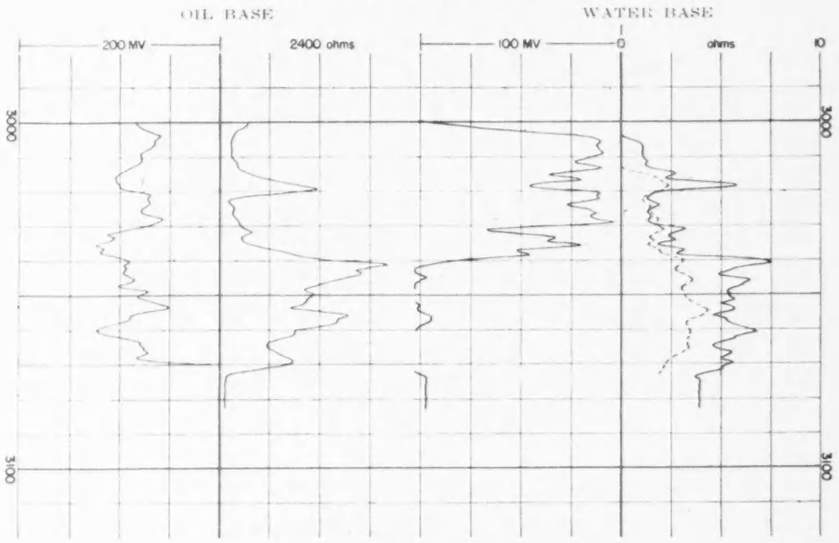
Oil Base Mud Characteristics and Handling

The two commercial oil base muds now available were tested and found to have similar characteristics but different controlling features. The methods for controlling these muds have been the deciding factor in their success or failure on many wells.

One of these commercial oil base muds is composed of diesel oil-blown asphalt, sodium chloride, caustic soda, sodium silicate, and tall oil as the active ingredients with crushed limestone as the weighting material. The viscosity and gel of this mud is controlled by the pH, using sodium silicate and tall oil to adjust the pH as desired. This mud forms a viscous emulsion with fresh water; for this reason, great care has to be taken to prevent water contamination. Strong salt water will not interfere with the viscosity control of the mud as much; therefore, salt is used to counteract the effect of an entrained water.

Presented at the spring meeting of the Southwestern District, API Division of Production, Shreveport, May 17-18, 1946.

FIGURE 1
Well 55-36S
Comparative Electric Logs in Same Well



The other commercial oil base mud is composed of diesel oil, air blown asphalt, and calcium oxide with ground limestone added for weight. The controlling factors in this mud are obtained at the mixing plant through the use of a diesel oil, having definite characteristics and an air-blown asphalt of a specified nature with the calcium oxide added as a settling inhibitor which also combines with any water in the mud. This mud is affected by water, but additional calcium oxide will take up any excessive volume of water which might be entrained in the mud.

These commercial muds react somewhat the same in a well and both have been used successfully. The mud viscosity varies with changes in temperature, but since it is similar to the viscosity of a true fluid, this is not troublesome. Any viscosity from 60 to 90 seconds API is desirable and conditions are unchanged in the drilling operation with variations of viscosity in this range. The fluid loss into the formation is very small and a thin film is plastered on the walls of the hole. The mud weight may be varied to meet drilling conditions and the weighting material is adequately suspended in the mud.

Oil-base mud materially improves knowledge of reservoir properties without introduction of serious difficulties

The use of oil-base mud requires special handling. This is necessary in order to minimize expensive mud losses, prevent water entrainment, insure rig cleanliness, and guard against fire hazard.

In order adequately to handle oil-base mud it is necessary to install additional equipment at the rig. This includes storage tanks for the oil base mud, steel mud pits for the circulating system larger mesh shale shaker screens, steel pipe racks with adequate drain, neoprene pump parts, neoprene lined mud hoses and neoprene pipe wipers.

Comparative Analysis of Electric Logs

Electric logs were run in each well after coring with oil-base mud. Due to the high resistivity of this mud, it was necessary to use contact electrodes. These contact electrodes were the knife type, which keep fairly constant contact with the formation. In order to compare the electric logs on the first two wells cored with oil-base muds, the contact electrode was run and then

FIGURE 2

Well 33-35S

Comparative Electric Logs in Same Well

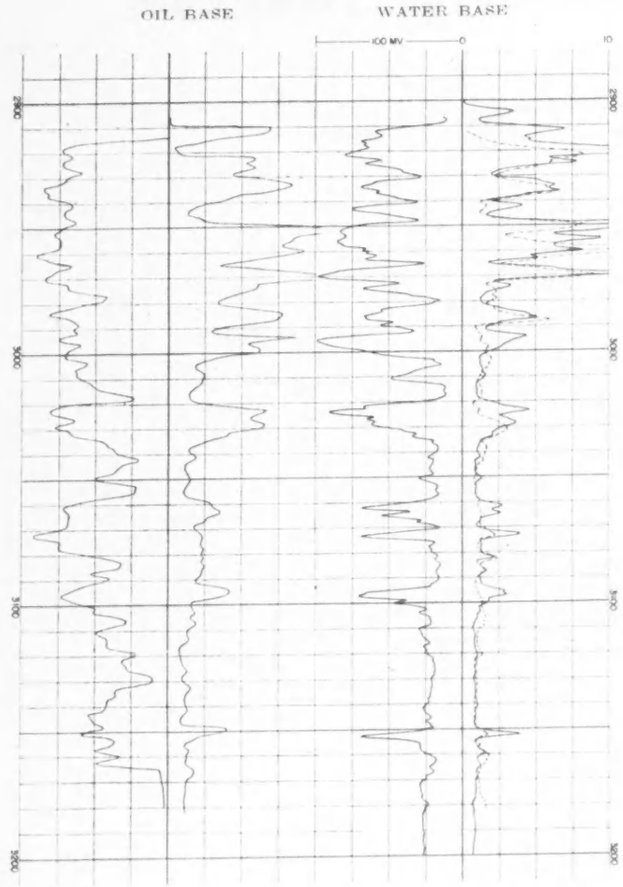


FIGURE 3

Well 73-6G Well 82-6G

Comparative Electric Logs on Oil-Base Mud Well and Offset Natural Mud Well.

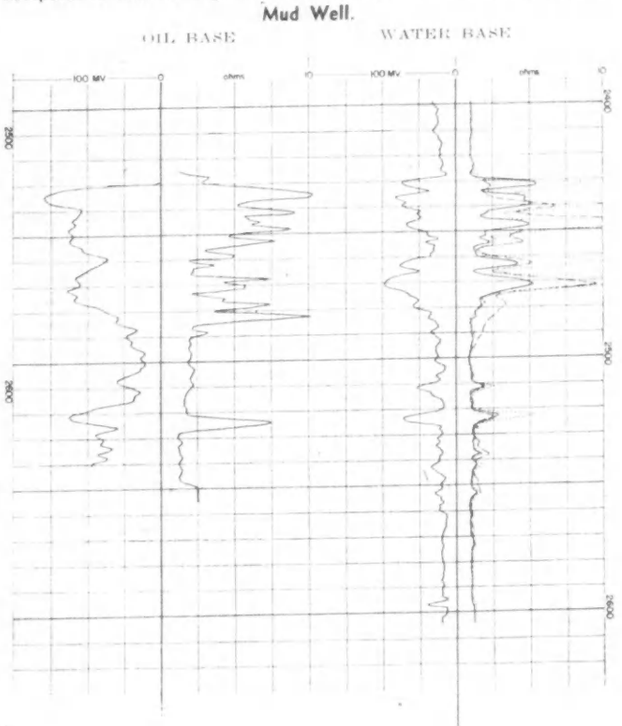
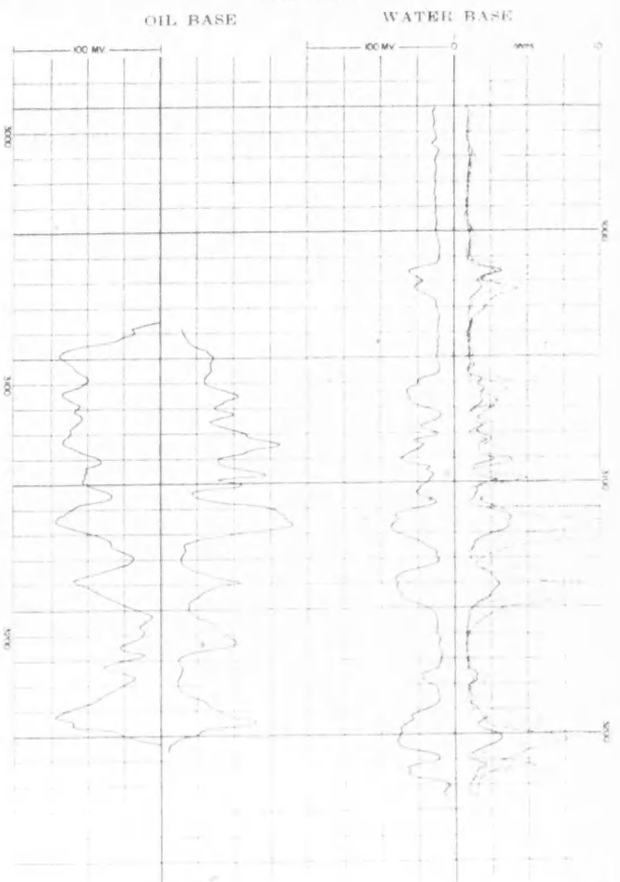


FIGURE 4

Well 57-28S Well 77-28S

Comparative Electric Logs on Oil-Base Mud Well and Offset Natural Mud Well.



the oil-base mud was replaced by a bentonite-water mixture and logged with the regular electrode.

Figures 1 and 2 show comparative results of electric logs run in the same wells, first with oil-base mud, and later with water-bentonite muds. It will be seen that these logs correlate very well, with the resistivity curve showing the formational breaks better than the self potential curve. However, it was found that the resistivity curves could not be used to define the fluid content of the formation.

Figures 3 and 4 show comparative logs between oil-base mud wells and offset wells logged with natural mud. These also show that good correlation can be obtained with contact electrode electric logs in oil-base muds, but they cannot be used to determine the gas-oil or oil-water contact. There were found to be some variations in the contact electric log in oil base mud which were hard to explain. This was believed to have been due to variation in resistance at the point of contact between the electrodes and the formation at the well bore.

Core Analysis Data

The cores were carefully cut with a conventional barrel in oil-base mud, pulled out of the hole without further circulation, and removed from the barrel with a minimum amount of delay. The cores were then examined by representatives of the Bureau of Mines and a commercial core laboratory, each

Here's a *Really Tough Job* A Nixon Regulator is handling

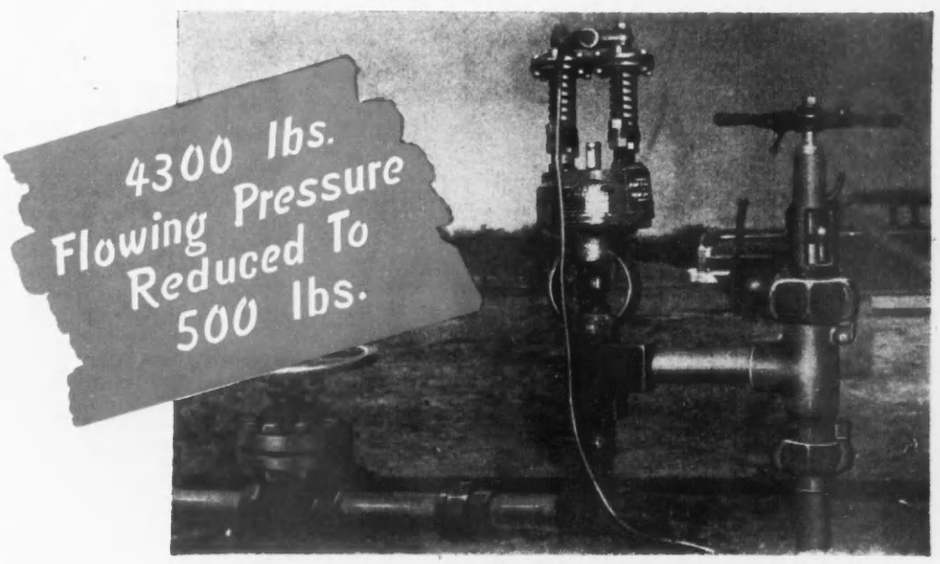


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TABLE 1

Comparative Data on Core Analysis—Bureau of Mines vs. Commercial Core Laboratory Core Analysis Data on Oil Base Mud, Well 73-6G

Depth and Sand	Permeability Md.		Porosity %		Residual Oil %		Residual Water %		NaCl Grains Per Gallon	
	Commercial Core Lab.	Bureau of Mines	Commercial Core Lab.	Bureau of Mines	Commercial Core Lab.	Bureau of Mines	Commercial Core Lab.	Bureau of Mines	Commercial Core Lab.	Bureau of Mines
2520	"86"		"29.6"		"57.1"		"18.6"			
21	1040		34.7		73.9		11.8			
23	1711	3000	36.5	34.5	72.9	88.4	13.4	13.4		1940
24	879	3000	31.7	31.0	68.5	76.4	16.7	19.0		4140
25	847	3000	31.4	29.7	58.3	53.2	21.3	26.2		2740
2526	1674	1800	29.6	29.6	65.3	82.0	16.5	16.6		1804
27	273	580	30.2	29.5	58.6	50.8	21.9	30.9		1990
28	1750	4800	30.4	29.0	70.0	58.8	15.5	23.5		2320
29	"35"		"28.3"	"27.8"	"27.2"	"27.0"	"55.2"	"58.9"		"1300"
30	1470	4300	30.3	27.2	62.4	51.4	21.4	34.7		1730
2532	1410		28.4	27.9	62.3	58.8	19.7	19.3		1510
33	1060		29.7	28.0	64.4	73.6	13.5	16.8		1840
35	675	1100	30.3	32.2	57.8	57.6	17.8	19.7		1820
52	"51"	"32"	"34.4"	"35.0"	"35.2"	"16.4"	"49.2"	"70.2"		"1660"
53	"66"	"150"	"34.3"	"32.2"	"29.7"	"21.7"	"57.1"	"66.8"		"1660"
2554	"18"	"370"	"35.8"	"35.4"	"42.9"	"44.3"	"43.4"	"44.2"		"1420"
Average	1161	2698	30.9	30.1	64.9	65.1	17.2	22.0		2183

N.B.: Figures in quotations ("0") not included in average.

TABLE 2

Water Base Natural Mud, Well 61-5G

Depth and Sand	Permeability Md Commercial Core Lab.	Porosity Percent Commercial Core Lab.	Residual Oil Percent Commercial Core Lab.	Residual Water Percent Commercial Core Lab.	NaCl Grains Per Gallon Commercial Core Lab.
2637	295	27.8	37.4	47.8	1229
38	"104"	"33.2"	"48.5"	"29.2"	"1827"
42	430	32.0	48.7	36.6	1567
43	744	34.4	51.3	28.1	2252
44	802	32.9	54.5	33.8	1395
2645	668	31.5	45.5	36.7	1154
46	1388	30.7	49.8	38.1	1500
47	203	34.2	55.5	20.4	3443
48	220	31.0	42.6	41.0	2233
51	1090	28.3	47.3	38.5	991
2654	290	29.1	13.4	75.6	2020
55	1425	30.4	16.4	68.2	1945
56	680	33.0	27.6	52.3	693
57	4357	30.8	35.0	41.1	768
58	3895	35			
Lost Core:					
2670	1645	35.2	41.2	31.5	
71	749	34.8	54.6	27.4	2914
79	9200	33.4	23.9	46.2	
80	6200	34.2	19.3	43.8	841
81	4060	40.2	40.3	30.1	
2682	1510	41.3	38.3	29.8	609
83	222	38.8	35.8	37.6	
84	795	31.6	37.3	33.4	2000
85	388	32.5	21.9	37.8	
86	110	34.4	39.9	35.8	1625
2687	418	32.7	42.5	32.1	
88	"67"	"37.3"	"36.7"	"41.6"	"1933"
Average	1669	33.2	38.3	39.7	1633

N.B.: Figures in quotations ("0") not included in average.

TABLE 3

Production Data

Oil Base Mud vs. Water Base Mud

Water Base Mud	OIL PRODUCTION (B/D)			Wells Shut In	Static Bottom Hole Pressure Lb. Sq. In.	Sand Thickness Feet	Producing Formation	Productivity Index
	Initial							
Date Tested	1-30-45	2-9-45	2-19-45	8-20-45			Sub-Scale No. 2	
Well No. 38-29S	552	595	578	133	564	24	Malima	0.99
Oil Base Mud:								
Date Tested	2-24-45	3-1-45	3-8-45	8-20-45			Sub-Scale No. 2	
Well No. 48-29S	944	939	830	251	455	26	Malima	4.65
Water Base Mud:								
Date Tested	7-18-45	7-28-45	8-9-45	8-21-45			Sub-Scale No. 1	
Well No. 47-1G	88	85	106	65	110	31		0.98
Oil Base Mud:								
Date Tested	5-23-45	6-1-45	6-11-45	8-20-45				
Wel No. 38-1G	374	330	369	423	136	35	Sub-Scale No. 1	7.5

taking six inches of every foot of sand recovered. Analysis of these cores was started immediately. Only a representative sample from the center of the core was used to determine the desired data. The permeability, porosity, water, oil, and salinity of each sample were obtained by both analyzers. Since the analytical procedure used by the Bureau of Mines differed from that used by the commercial core laboratory, some very interesting comparisons were made available.

Figure 5 is a composite log showing the lithology, electric log, and core analysis data obtained with oil-base mud. As shown by this composite log, the electric log fairly well defines the formation changes, but is valueless in determining fluid content. These core analysis data were very good and are representative of the results obtained from the analysis of the other wells cored with oil-base mud in this field. It may be observed that the sands of low permeability in these cores show high water content and the high permeability sands in the oil zone show low water saturation. The salinities, which had been used in the previous water base analysis as an indication of the amount of flushing in the cores, were found to vary considerably throughout the entire section.

There did not seem to be any correlation between the other data and the variation in salinity, and it is not known whether this variation was due to actual formational salinity or the inaccuracy of the analysis.

A studied comparison of the core data resulted in the conclusion that the accuracy of the core analysis was exceptionally good, considering the various factors which entered into the analysis. Table 1 compares the results obtained by the Bureau of Mines and a commercial core laboratory on equally divided cores in the same sand section. There is considerable variation between the two sets of data, but the trends are in the same direction and the average of the data is very close. This is as good as might be expected, since the samples varied somewhat throughout the section and the method of analysis is entirely different.

A comparison of these data with a well cored with water base mud shows considerable flushing and a much lower salinity. Table 2 shows an analysis of an offset well cored with natural muds in the same sand section, and analyzed under the same conditions. A comparison of Table 1 and Table 2 shows the permeability and porosity of the sands to be in the same order but the water saturation is much higher and the oil saturation is considerably lower in the cores taken with water-base mud. Although the salinities are somewhat lower in the water base analysis, the variations in salinity are in the same order.

A careful review of these data indicates that use of oil base mud for core analysis gives a much closer picture of reservoir saturations and salinities, but proved not especially beneficial for porosity and permeability determination.

Well Completions

The completions of the wells with oil-base muds were very simple and extremely satisfactory in most cases. The usual completion procedure in this field

with natural muds was to change mud to water and bail or swab the well until it had cleaned up. However, with oil-base mud, it was not necessary to either bail or swab and the wells came in immediately making pipe line oil.

Comparative production data are shown in Table 3 for offset wells drilled with natural mud and oil base mud in the same sand section. Production tests were run initially when the well was completed and continued until the wells were shut in at the end of the war. It will be noted that one comparison of offset wells showed, for the oil base completion, higher initial production and a higher productivity index, although the bottom hole pressure was 109 lbs. per square inch lower. The other offset test showed, for the oil base completion, higher initial production which had increased up to the time the well was shut in while the productivity index was 7.5 for the oil base against .90 for the natural mud completion.

Insufficient data has been collected in this field to definitely state that these initial increases will be sustained over the life of the well.

Conclusion

It is believed the use of oil-base mud in these wells proved that this mud has a definite place in drilling, coring and completing certain wells.

During the drilling operations it is found that, with careful supervision, oil-base mud is no more trouble and does not present any greater problem than the use of natural mud in the same area.

Oil-base mud in conjunction with certain plastic tracers soluble in oil but not in water, such as have been developed by the Shell Oil Company, will probably give the most accurate core analysis data obtainable at the present time.

In low pressure, or low permeability sands, and sands containing bentonitic material, the use of oil-base mud in completions will be a definite benefit.

Although it was necessary to drill and complete the wells at Elk Hills during the wartime emergency in a minimum of time, and with a minimum of testing, it is believed that the core analysis data obtained from these wells using oil-base mud, made possible a more thorough and accurate knowledge of reserves and reservoir characteristics necessary for the best future reservoir control.

Stanolind Oil & Gas Company's producing department has made a thorough study of oil-base mud drilling. A well in the North Katy field, Texas, has just been completed, coring through two oil sands with oil base mud. Electric logs were made by two well known services. Gamma ray and neutron logs were also run, both before and after cementing. Caliper logs and temperature surveys were made.

The hole caliper survey showed not more than one inch over gauge at any point and the various other logs correlated closely with the core data, to show formational breaks with a doubtful fluid definition.

Some flushing was found in the cores, but the water saturation values determined by core analysis, correlated surprisingly well with capillary pressure-saturation tests, indicating accurate connate water figures in the oil zone.

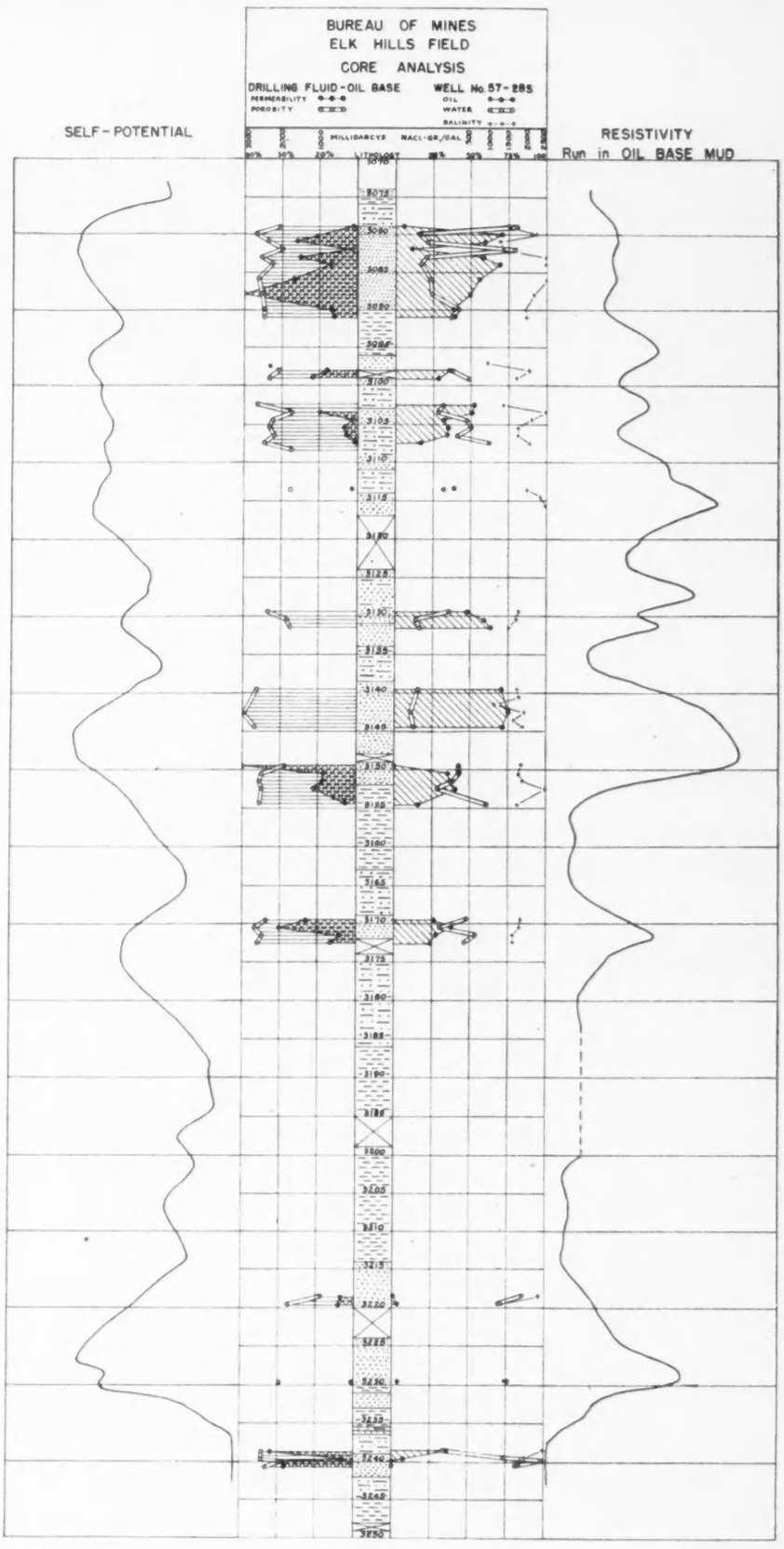

FIGURE 5

BY AN EXPERIENCED CREW

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True, the search for oil will never end. And thanks to new geophysical techniques, the ratio of productive completions to exploratory tests is up.

For more than a decade, General Geophysical has helped keep these new discoveries on the upward trend by accurately applying these new techniques . . . with modern equipment . . . by skilled and experienced personnel.

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1946 Exploration May Set New High

THE 1946 search for new sources of oil and gas is now well under way, and nothing is indicated to prevent it from topping the previous all-time exploration high set last year.

As the year began industry indicated intentions to drill slightly more wildcats and a few less total wells than in 1945. However, at this time the total wells drilled figure is about 12 percent higher than for the same period last year, which seems to point to an even higher margin of increase in wildcats than was expected. This accelerated exploration rate is part of the industry's answer to the extremely heavy postwar demand for petroleum and its products, which has exceeded even the most liberal forecasts. Contrary to the belief of many, the petroleum industry is not holding operations to the prewar level, but instead is stabilizing them far above the 1941 level and very close to war-time highs, in preparation for peacetime expansion.

During April, 1946, there were 359 exploratory wells completed in the U. S., which exceeds the 324 wells drilled in the preceding month and the 323 exploratory wells completed during April of last year. For the first four months of this year the exploratory figure is 1372 wells drilled, which represents a 2.6 percent increase over the 1337 finaled during the four-month period of 1945. This stepped-up exploration program is following the pattern set by drilling in general, exploratory and non-exploratory,

Summary of Results of Exploratory Drilling

ITEM	April, 1946	Mar., 1946	4 Months JAN.-APRIL 1946	1945	Percent Diff.
Oil Discoveries	43	42	158	158	
New Fields	15	24	90	109	— 17.4
New Pays	28	18	68	49	+ 38.8
Distillate Discoveries	11	5	22	17	+ 29.4
New Fields	5	3	10	13	— 23.1
New Pays	6	2	12	4	+200.0
Gas Discoveries	12	9	48	37	+ 29.7
New Fields	7	9	35	31	+ 12.9
New Pays	5		13	6	+116.7
Total Discoveries	66	56	228	212	+ 7.4
Extensions to Fields	19	16	67	55	+ 21.8
Oil Fields	15	8	47	47	
Distillate Fields		6	18	7	+157.1
Gas Fields	4	2	2	1	+100.0
Total Prod. Tests	85	72	295	267	+ 10.5
Dry Holes	274	252	1,077	1,070	+ 0.7
(Weekly Average)	68.5	63.0	63.4	62.9	+ 0.7
Wildcats	271	248	1,049	1,032	+ 1.6
New Pays	1	1	18	21	— 14.3
Outposts	2	3	10	17	— 41.2
Total Expl'tory Tests	359	324	1,372	1,337	+ 2.6
(Weekly Average)	89.8	81.0	80.7	78.6	+ 2.6
Percent Productive: (Weekly Average)	23.7	22.2	21.5	20.0	
Percent Dry: (Weekly Average)	76.3	77.8	78.5	80.0	

Dry hole completions are from weekly reports and totals represent completions for 4 weeks in April, 1946; 4 weeks in March, 1946; 17 weeks in Jan-April, 1946; 17 weeks in Jan.-April, 1945.

Results of Exploratory Drilling in April and First 4 Months, 1946-1945, by Districts

State or District	MONTH OF APRIL, 1946													FIRST FOUR MONTHS, 1946															
	Productive Tests									Unproductive Tests			Total Exploratory Tests	Productive Tests								Unproductive Tests				Total Exploratory Tests	
	New Fields			New Pays			Extensions			Total Productive				New Fields			New Pays			Extensions			Total Productive		Total Dry			
	Oil	Gas	Dis.	Oil	Gas	Dis.	Oil	Gas	Dis.		Wildcats	New Pays	Outposts		Oil	Gas	Dis.	Oil	Gas	Dis.	Oil	Gas	Dis.	4 Mo. 1946	4 Mo. 1945	Wildcats	New Pays	Outposts	4 Mo. 1946	4 Mo. 1945	4 Mo. 1946	4 Mo. 1945
Alabama											1			1												5			5	4	5	4
Arizona											1			1												1			1		1	
Arkansas																					1			1		7		1	8	13	9	13
California				1			2			3	19			22	3	2		3			4	1		13	4	81			81	82	94	86
Colorado							2			2	2			4							3			3	1	5			5	2	8	3
Florida											1			1												6			6	4	6	4
Georgia																										1			1	3	1	3
Illinois	1			1			6			8	49			57	4			3			13			20	29	135			135	90	155	119
Indiana							1			1	4			5				2			2			4	2	13			13	31	17	33
Iowa																															1		1
Kansas	4			1			2			7	18			25	14	3		2			13	1		33	32	76			76	98	109	130
Kentucky		1		1						2	8			10	2	2		3						7	2	29			29	32	36	34
Louisiana	2	1	2	7	2	3				17	19	1		37	10	1	3	12	2	5		2		35	27	60	1		61	48	96	75
North Louisiana	1	1	1		1	1				5	8	1		14	3	1	1		1	2		1		9	5	33	1		34	30	43	35
South Louisiana	1		1	7	1	2				12	11			23	7		2	12	1	3		1		26	22	27			27	18	53	40
Michigan	1				1		1			3	14			17	4				3		3			10	9	66		1	67	72	77	81
Mississippi		1								1	2			3	1	1						1		3	4	19			19	46	22	50
Missouri											2			2												3			3	6	3	6
Montana				1						1	1			2				1						1	1	3			3	3	4	4
Nebraska																															2		2
New Mexico											5			5				1			1			2	5	19	1		20	19	22	24
New York																										1			1		1	
Ohio		1						3		4				4	1	7						8		16	11	12			12	21	28	32
Oklahoma	2	1	1							4	24			28	21	6	1	2	5		1		1	37	36	90			90	86	127	122
Pennsylvania																2								2							2	
Tennessee											1			1												2			2	1	2	1
Texas	5	1	2	16	2	3		1		30	98		2	130	28	8	6	38	2	7	5	4	1	99	100	405	16	8	429	396	528	496
E. Texas Border	1		1	1						3				3	2	3	1	1				1		8		2			2	7	10	7
Rest of E. Texas			1							1	7			8	1		1	1			1	1		5	3	32	2		34	24	39	27
North Texas				2						2	34			36	8			7						15	14	114	3		117	92	132	106
West Central Tex.	1			3						4	11			15	6	1		3						10	8	53	3	1	57	40	67	48
West Texas	1			4						5	4		2	11	3	2		8			1			14	20	46	5	4	55	84	69	104
Panhandle											3			3												8	1		9	5	9	5
Upper Gulf Coast				6	2	2		1		11	9			20	3		3	11	2	2	3	1	1	26	24	42		2	44	38	70	62
Lower Gulf Coast						1				1	8			9			1	6		5		1		13	21	46	2		48	62	61	83
Southwest Texas		1								1	14			15		2		1						3	8	34		1	35	36	38	44
South Central	2									2	8			10	5									5	2	28			28	8	33	10
Utah															1									1		1			1		2	
West Virginia											1			1		2								2		4			4		6	
Wyoming		1					1			2	1			3	1	1		1	1		1	1		6	4	5			5	10	11	14
Total U. S.	15	7	5	28	5	6	15	4	....	85	271	1	2	359	90	35	10	68	13	12	47	18	2	295	267	1049	18	10	1077	1070	1372	1337

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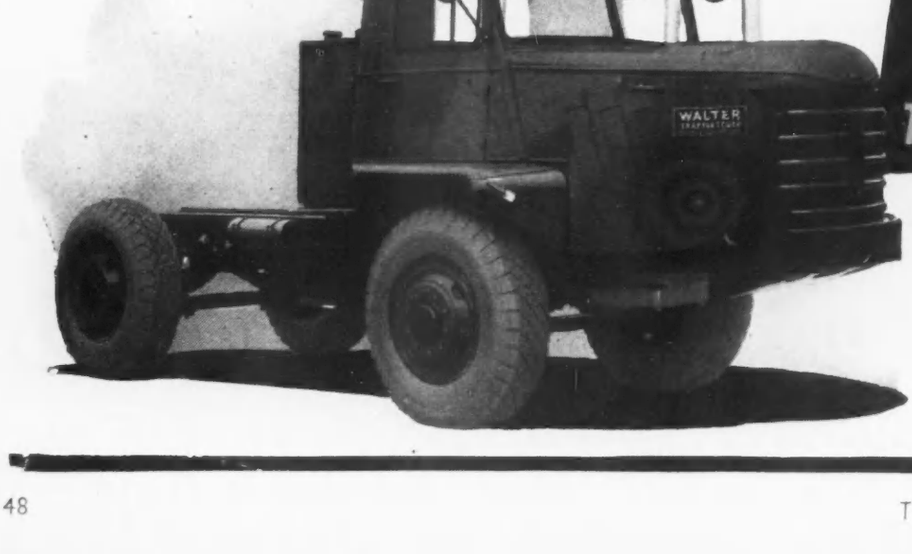

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which now holds a 12 percent lead over the overall program of last year's period.

During April, 23.7 percent of the total exploratory tests were successful, while the degree of success during March amounted to 22.2 percent. Of the 1372 tests drilled during the first four months, 21.5 percent were producers, while 20 percent were successful during the same period of 1945.

The number of new sources of oil for the first four months total 158, the same as last year's figure. New oil fields opened amount to 60, a 17.4 percent drop from last year's 109, but new pay horizons found in existing fields total 68, an increase of 38.8 percent over last year's 49. The number of extensions to existing oil fields so far this year is tied with last year's figure at 47.

There were 22 new sources of distillate discovered through April, compared with 17 in last year's first four months. Of these discoveries ten were new fields, while 13 new fields were opened during the same period last year. New horizons in old distillate fields now total 12 for this year against four for last year's four months. Outposts to producing distillate fields total 18, while only four were established in the like period of 1945.

So far this year there have been 48 new gas discoveries, compared with 37 for last year, showing an increase of 29.7 percent. This total includes 35 new gas fields, while last year's period showed 31. New pays in established gas fields completed the total with 13 new horizons, which more than doubles the previous year's seven new levels. Until the end of April, two gas fields had been extended, while only one extension had been made in last year's comparable period.

During the first four months of the current year there have been 1077 unsuccessful exploratory tests, slightly more than the 1070 drilled a year ago. This unproductive total includes 1049 strict wildcats, 18 new pay tests, and 10 efforts to extend established fields.

Warren-Hanlon Deal

Papers have been signed for the acquisition by Warren Petroleum Corporation, Tulsa, of the various Hanlon companies, the deal involving between $10 and $14 million. Officials of the Hanlon companies will be taken into the Warren organization.

F. I. Hanlon, head of the Hanlon companies, and D. F. Buchanan, president of Hanlon-Buchanan, Inc., will dispose of their interests in the companies and have not announced their plans except Buchanan said he will spend considerable time on his ranch in Colorado.

Venezuela's March Production Averages Million Barrels Daily

Crude output in Venezuela during March, 1946, averaged more than a million barrels daily. During the week ended March 11, production averaged 1,042,350 barrels a day, or 77,031 barrels above the wartime peak reached in August, 1945.

Refineries operated normally, according to the *Foreign Commerce Weekly*, with throughput at the La Salina heavy-crude processing plant showing an increase reflecting heavier foreign demand.

New Oil and Gas Fields and New Pay Horizons Discovered in the United States in April, 1946

Also Important Extensions to Established Fields

COUNTY	FIELD	COMPANY, WELL AND LOCATION	Date Spudded	Date Completed	Total Depth (Feet)	Completion Horizon (Feet)	[1]Name Character and Age of Producing Formation	[2]Initial Production Method and Choke	Gravity of Oil	[3]Structure: [4]Method of Discovery	Tentative Evaluation of Discovery or Extension (Opinion of Relative Importance of Area from General Viewpoint of the Industry Based on Pertinent but Necessarily Incomplete Data: Later Development or More Complete Data Obviously Might Require Revision of this Tentative Opinion).
		COLORADO—Oil Field Extensions									
Rio Blanco	Rangely	Algord Oil Co.'s Guiberson 1, c se ne 18-2n-102w, ½ mi n ext		3-25-46	6575	6334- 6480	Weber sd; Penn	F 518; ⅜"			
Rio Blanco	Rangely	Continental Oil Co.'s Rooth 1, c nw sw 15-2n-103w, 1½ mi ne ext		3-10-46	6816	6320- 6544	Weber sd; Penn	F 865			
		ILLINOIS—New Oil Field									
Gallatin	Omaha, E	Deep Rock's Pioneer Trust Bank 1, nw ne se 2-8s-8e, 2½ mi e of Omaha pl and 4½ mi s of Roland pl.	3- 9-46	4-23-46	2980	2853- 2862	L O'Hara li; L Miss	P 19			
		ILLINOIS—New Oil Pay									
White	Storms	Sinclair and Ohio's H. Aldrich (Loridge) 1, nw se se 1-6s-9e	3-30-46	4-30-46	2366	2361- 2365	Tar Springs sd; Miss	P 42			One of the shalwst pays in the pl but dpr than offset wells.
		ILLINOIS—Oil Field Extensions									
Christian	Mt. Auburn	Wrather's Thompson 1, se se se 15-15n-2w, 1½ mi n ext	12- 7-45	4- 9-46	1896	1870- 1877	Silurian li; Sil	P 31; 42 wtr			Now being offset.
Clay	Hoosier	K-B- Drlg Co.'s Hastings 1, sw se sw 12-4n-7e, 1½ mi s ext	3-25-46	4-30-46	2638	2603- 2621	Cypress sd; Miss	P 25			2nd well in pl and much better than disc.
Jasper	Willow Hill	J. J. Lynn's Hippler 1, nw nw se 27-7n-10e, 1 mi n ext	3-15-46	4-23-46	2776	2665- 2670	McClosky li; Miss	P 60			
Richland	Calhoun	Pure's Howard 1, ne ne se 13-2n-9e, ½ mi s ext	3- 1-46	4- 9-46	3170	3157- 3161	McClosky li; Miss	F 1395			½ mi s of Calhoun pl and less than 1 mi e of Gallagher pl. Drlg in progress may connect the 2 pls.
			3-13-46	4- 9-46	3181	3166- 3174	McClosky li; Miss	F 786			2nd well in pl and much better than disc.
Richland	Gallagher	Pure's Gallagher 1, sw sw sw 12-2n-9e, ¾ mi n ext	1-18-46	4-23-46	3114	3099- 3107	McClosky li; Miss	P 12; 36 wtr			Nearly a mi nw of Roland pl and abt the same e of the abnd Gossett pl.
White	Roland	Sun's Okerson 1, nw sw ne 9-7s-8e, 1 mi nw ext									
		INDIANA—Oil Field Extension		4-10-46	2135	2110- 2117	Tar Springs sd; U Miss	P 150			
Posey	Griffin	Fox and Fox's Audrey 1, se sw nw 10-4s-14w									
		KANSAS—New Oil Fields		4-21-46	3644	3638- 3644	Reagan sd; Cam	Sw 75	40	Str trp; dr	Fair strike; may link with Albert pl to the e.
Rush		Darby-Bothwell, Inc.'s Wagner 1, nw ne ne 28-18s-16w, 1½ mi w of Albert pl.		4-25-46	2995	2992- 2995	Burgess sd; Penn	P 828	39	Ant; seis-dr	Impt strike; ext of struct not determined; sevrl dry hls have bn dr in gen ar; sd permbl and porous; gd rec expected.
Sedgwick		Beech Aircraft Corp.'s Hinkle 2, se ne ne 1-27s-1e, 1¾ mi ne of Wichita									
				4-30-46	3882	3743- 3762	Lansing li; Penn	P 480	38	Ant; seis	Good strk; structrl ext undet with some control possible from dry hls in immediate area.
Stafford		Alkay Oil Co.'s Gray 1, sw ne ne 11-24s-13w, 2 mi n of St. John pl		4-10-46	3476	3469- 3476	Arbuckle li; Cam	P 60	38	Str trp; sub	Not considered important.
Sumner	Margaret	Ashland O & R Co.'s James 1, nw sw ne 36-32s-2e, 2½ mi nw of Thurlow pl.									
		KANSAS—New Oil Pay		4- 5-46	4523	4445- 4452	Fort Scott li; Penn	P 275	38	Ant; seis	Import new prodtv zn for field.
Ness	Arnold	Sohio Pet. Co.'s Drake 1, nw sw nw 26-16s-25w, in Anoldn pl								Ant; dr	
		KANSAS—Oil Field Extensions		4-23-46	3582	3575- 3582	Reagan sd; Cam	P 144		Ant; seis-s:b	Opens up approx 400 acs; sd porous, permbl; gd recovery expected.
Barton	Merten	E. M. Hilton et al's Schultz 1, ne ne ne 8-19s-15w, 1 mi w ext		4- 4-46	3683	3678- 3683	Reagan sd; Cam	P 228			
Norton	Ray	Cities Service's Finnegan 1, sw se se 25-5s-21w, ¾ mi w ext									
		KENTUCKY—New Oil Pay		4- -46	1500	1466- 1477	Tar Springs sd; U Miss	P 40			
Daviess	Panther	Miller and Schiarello's Lochman 3, 12-n-27									
		KENTUCKY—New Gas Field		4- -46	1200	1158- 1168	Waltersburg sd; U Miss	F 5.3 mln			
Daviess		Watkins Drlg Co.'s J. E. Massey 1, nw nw ne 25-P-29 at w limits of Owensboro									

New Oil and Gas Fields and New Pay Horizons Discovered in the United States in April, 1946

Also Important Extensions to Established Fields

COUNTY	FIELD	COMPANY, WELL AND LOCATION	Date Spudded	Date Completed	Total Depth (Feet)	Completion Horizon (Feet)	[1]Name Character and Age of Producing Formation	[2]Initial Production Method and Choke	Gravity of Oil	[3]Structure: [4]Method of Discovery	Tentative Evaluation of Discovery or Extension (Opinion of Relative Importance of Area from General Viewpoint of the Industry Based on Pertinent but Necessarily Incomplete Data: Later Development or More Complete Data Obviously Might Require Revision of this Tentative Opinion).
		NORTH LOUISIANA—New Oil Field									
Richland		R. T. Sellar's L. P. Ford 1, c ne nw nw 12-16n-7e	3-12-46	4-16-46	3203	2860- 2869	Tuscaloosa sd; U Cre	F 290; 1/4"	39.9		
		NORTH LOUISIANA—New Distillate Field									
Lincoln		Calif. Co.'s Ida Rogers Richards 1, 11-18n-2w	12-22-45	4-20-46	9343	9096- 9120	Bodcaw sd; Jur	F 210; 1/4"	53.6		
		NORTH LOUISIANA—New Distillate Pay									
Claiborne	Haynesville	Ohio Oil Co.'s Bond-Benne Unit 1-H, 22-23n-8w	9-13-45	4-18-46	10773	9990-10130	Cotton Valley sd; Jur	122; 1 mln; 1/8"	52		
		NORTH LOUISIANA—New Gas Field									
Franklin		R. J. Caraway-F. L. Bryant's Mrs. M. L. Ruple 1, 9-16n-8e	3-16-46	4-13-46	3510	3024- 3036	Tuscaloosa sd; U Cre	F 41.5 mln			
		NORTH LOUISIANA—New Gas Pay									
Tensas	Lake St. John	Calif. Co.'s J. W. Brown 3, sw 46-9n-10e	11- 1-45	4-30-46	10287	10222-10250	Brown sd; L Cre	F 4.5 mln; 1/4"			
		SOUTH LOUISIANA—New Oil Field									
LaFourche	Little Temple	Humble's Louisiana Delta Farms Co. 1, 19-17s-23e	10-31-45	4-16-46	12007	10585-10635	Miocene sd; Mio	F 70; 75% wtr 3/8"	30.8	SD; rfl, seis	May see further develop during 1946.
		SOUTH LOUISIANA—New Oil Pays									
Calcasieu	Iowa	Shell's F. Heyd 35, ne 1/4 13-9s-7w	3- 3-46	4- 3-46	5262	5170- 5195	Miocene sd; Mio	163; .7 mln; 3/4"	34.5	D; rfl, seis	Probably sml lense sect prevelant in field.
Cameron	Cameron Meadow	Magnolia-Humble's Cameron Meadow 43, 28-14s-13w, 3/4 mi s of prod	11- 4-45	4- 9-46	7638	7545- 7595	Miocene sd; Mio	40; .6 mln; 1/8"	39.5	SD; rfl, seis	To increase activity on s side of fld.
Iberia	Avery Island	Humble's Petit Anse Co., 10-B, 23-13s-5e	1-15-46	4-13-46	9866	8481- 9500	Miocene sd; Mio	F 292; 3/4"	33.6	SD; rfl seis	
Iberia	Weeks Island	Shell's Smith-State Unit 1, Lse 500-2, 13-14s-6e	6-14-45	4- 4-46	14391	13763-13780	Miocene sd; Mio	F 553; 5/8"	33	SD; rfl, seis	World's deepest oil Producer.
St. Mary	Charenton	Lynn Oil Co.'s Hine Est. 2, swc lot 8, 31-13s-10e	1- 7-46	4- 2-46	7004	6458- 6505	Miocene sd; Mio	F 150; 3/4"	38	D; rfl seis	
Vermilion	White Lake	Union of Calif.'s Vermilion Parish School Board 2-A, 16-15s-1e. (OWWO)	2-23-46	3-27-46	10600	9906- 9935	Miocene sd; Mio	F 188; 1/8"	36.1	SD; rfl seis	
Vermilion	White L., W	Union of Calif.'s State-White Lake Lse 540-2-A, (OWWO), 1320 w of disc well 1-A.	6-23-44	3-28-46	10750	7318- 7326	Miocene sd; Mio	F 195; 3/4"	41.1	SD; rfl seis	
		SOUTH LOUISIANA—New Distillate Field									
Cameron		Continental's Cameron Parish School Board 1, 16-15s-14w, Johnson's Bayou area.	1-19-46	4-10-46	9302	7312- 7320	Miocene sd; Mio	5; 1.8 mln; 3/16"	50	Flt SD; rfl seis	Thin sand sect. not important.
		SOUTH LOUISIANA—New Distillate Pays									
Acadia	Branch	Union Sulphur Co.'s Bruner-Bonin 1, 60-8s-2e	12-15-45	3-19-46	11919	11808-11825	L Chickasahay sd; Olig	4.3 mln; 1/2"		Flt; rfl seis	Extends fld production 2000 feet.
Cameron	Mud Lake	Magnolia's Lutcher 1-B, 800 ft n of disc well 1-A, 33-14s-11w	11-20-45	3-25-46	10825	9636- 9658	Gueydan sd; Olig	31; 3 mln; 3/16"	48.3	D; rfl seis	
		SOUTH LOUISIANA—New Gas Pay									
St. Landry	Cankton, N.	Sun's L. A. Guidry 1, 13-8s-3e	12-27-45	3-23-46	10550	10193-10228	L Chickasahway sd; Olig	No gauge		D; rfl seis	
		MICHIGAN—New Oil Field									
Van Buren		Ford Oil Co.'s Tolles 1, sw se ne 10-1s-16w, 2 mi nw Breedsville pl	3-18-46	4-12-46	1112	1111- 1112	Traverse li; Devo	F & Sw 110		Coral reef; geol	Probably small pool typical of area.
		MICHIGAN—Oil Field Extension									
Isabella	Sherman	Chartiers Oil Co.'s Diehl 1, n1/2 nw sw 29-15n-6w, 1 mi nw ext	11- 1-45	4-11-46	3779	3280- 3295	Traverse li; Devo	F 68; 1.5 mln	46	Ant; geol	Offers promise for oil or gas over several hundred acres.
		MICHIGAN—New Gas Pay									
Roscommon	Roscommon	E. V. Hilliard's State E 1, ne nw sw 20-21n-3w	11- 9-45	4-21-46	4133	1470- 1525	Stray sd; Miss	F 1.1 mln			
		MISSISSIPPI—New Gas Field									
Warren	Kings	Magnolia's Ruth Pidgeon 2, swc se se 27-17n-4e, 3 mi n of Vicksburg	2- 6-46	3-12-46	2546	2037- 2047	Gas Sand sd; U Cre	F 1.1 mln; 1/4"		SD; seis	1st successful producer in 37 tests in this county. Geol very favorable and disc should spur further development.
		MONTANA—New Oil Pay									
Petroleum	Cat Creek	Ralph Chamberlin's Rhens 12-A, ne ne se 9-15n-29e (OWDD)		4-10-46	1753	1740- 1753	Ellis sd; Jur	F 50			
		OHIO—New Gas Field									
Muskingum		Pure Oil Co.'s H. C. Eppley 1, se sect 26, Newton Twp		3- -46	3475	3417- 3444	Clinton sd; Sil	F 2.5 mln.			
		OHIO—Gas Field Extensions									
Lorain	Wellington, N.	Ohio Fuel Co.'s E. R. McConnell 2, lot 137, Pittsfield Twp., 1/2 mi s ext		4-10-46	2216	2205- 2216	Clinton sd; Sil	F 1.5 mln			
Morgan	Brush Creek	Ohio Fuel Gas Co.'s Geo. E. Carr 1, sect 27, Deerfield Twp., 3 mi s ext		4-20-46	4278	4241- 4258	Clinton sd; Sil	F 1.4 mln			
Stark	Canton, N	Obermiller et al's J. G. Laughlin 1, sect 34, Plain Twp., 1 mi ext		4- -46	4635	4565- 4633	Clinton sd; Sil	F 4 mln			
		OKLAHOMA—New Oil Fields									
Jackson		The Texas Co.'s Hickman 1, sw nw nw 6-1n-19w, abt 2 1/2 mi nw of E. Altus pl		4-20-46	3032	1542- 1551	Granite Wash cgl; Perm	P 16	40	Ant; sub	Not considered important.
Okfuskee		Wilcox Oil Co.'s Hamby 1, se se ne 18-13n-10e, abt 2 mi nw of Haydenville pl		4-12-46	2859	2825- 2859	Dutcher sd; Penn	P 28	38	Ant; sies	Not considered impotr; struct prbly small.
		OKLAHOMA—New Distillate Field									
Garvin		R. H. Dearing & Sons' McBride 1, ne nw nw 30-4n-2w, abt 3 mi sw of Mayesville.		4-14-46	6665	6586- 6591	Deese sd; Penn	F 192; 2.5 mln	60	Ant; sub-seis	Opens import new dist area; struct may cover about 3 sections.
		OKLAHOMA—New Gas Field									
Lincoln		Roy Kemp et al's Corbin 1, se ne nw 32-17n-5e, abt 1/2 mi s of E. Agra pl		4- -46	3484	3458- 3481	Skinner sd; Penn	F 1.5 mln		Ant; dr	Small structure indicated.
		EAST TEXAS BORDER COUNTIES—New Oil Field									
Marion		M. A. Freeman's L. Stevenson 1, J. Perry sur, 2 mi nw Jefferson	12-21-45	4-19-46	7230	6495- 6507	L Pettit li; L Cre	P 165	39.7		
		EAST TEXAS BORDER COUNTIES—New Oil Pay									
Panola	Carthage	Skelly's S. E. Mathews 1, Wm. McFadden sur, 3 mi e of Beckville	2- 4-46	4-24-46	6715	6093- 6113	U Pettit li; L Cre	F 3.9 mln			
		EAST TEXAS BORDER COUNTIES—New Distillate Field				6246- 6256	L Pettit li; L Cre	P 170	29.3		First oil prod in great gas-dist area.
Harrison		Bert Fields et al's J. M. Furrh 1, L. Womack sur, 4 1/2 mi s of Waskom.	12-12-45	3-22-46	6305	5930- 5950	Travis Peak sd; L Cre	66; 2.2 mln 1/4"			
		EAST TEXAS—New Distillate Field									
Rusk		Delta Drlg. Co.-The Chicago Corp.'s C. G. Rayford 1, 6825 ft ewl and 6000 ft nsl of James Smith sur. A-709, 3 3/4 mi se of Henderson 2-pay dp ar, nearest	12-13-45	3-26-46	7519	7310- 7464	Travis Peak sdy-li; L Cre	13; .7 mln; 1/8"	61.3	Ant; geop	Sml yld for this depth. Possibly a large prodtv area; higher structrly than the Henderson fld.
		NORTH TEXAS—New Oil Pays									
Archer		L. T. Burns et al's L. F. Wilson 5-P, 990 ft snl and 450 ft wel sec. 115, ATNCL, offsetting shallow wildcat pumper.	2-27-46	4-20-46	4892	3879- 3902	Strawn sd; Penn	P 17; 12 wtr	40	Ant; geol	Uneconomical production

Wilbarger	National	National Associated Pet. Co.'s A. C. Smith 1, nw nw ne H&TC Ry. 30, blk 13	3-15-46	4- 4-46	3675	3663- 3675	Rock Crossing (Canyon) li; Penn	F 240; ¼"	38	Ant; geol	This 6th oil level for fld considered a stray zn; due to be erratic in performance.
		WEST CENTRAL TEXAS—New Oil Field									
Palo Pinto		Ashland O & R Co.'s S. F. Lee 1, 330 ft out of swc sect 1744, TE&L Co. sur 1¼ mi se of shallow gassers.	10-15-45	3- 3-46	5046	5039- 5046	Ellenburger dolo; Ord	P 73; 70 wtr	40.1	Ant; geol	Not important.
		WEST CENTRAL TEXAS—New Oil Pays									
Jones	Cooper	S. B. Roberts et al's O. J. Cooper 6, ne ne sw T&P Ry. 29, blk 15, 1000 ft n of 2092-ft Flippen li prod	2-19-46	3- 9-46	2342	2214- 2230	Gunsight li; Penn	F 237; ¼"	37	Ant; geol	Establishes 3rd and intermediate pay for fld; enlarges dual completion opportunities.
Jones	Cooper	S. B. Roberts et al's O. J. Cooper 7, nw nw se T&P Ry. 29, blk 15, e offset to Gunsight pay disc	3-21-46	4- 6-46	2340	2186- 2190	Hope li; Penn	P 231	40	Ant; geol	4th pay for fld and present in dpr producers.
Runnels	Huddleston	F. A. Gillespie Sons & Co.'s B. N. Wilke 1, 331 ft nsl and 5101 ft wel of Day Land & Cattle Co. sur., 1 mi e of 3500-ft Palo Pinto li prod.	6- 8-45	3-26-46	2500	2490- 2500	Canyon li; Penn	P 19; 25% w	40	Ant; geol	Not a profitable operation.
		WEST TEXAS—New Oil Field									
Pecos		Wm. Y. Penn et al's W. T. Shearer 1, 2310 ft from nel and 330 ft from nwl H&GN Ry. 41, blk 10, 3½ mi n of Lehn fld; 3½ mi sw of Abell fld.	2- 2-46	3-28-46	1964	1945- 1964	Yates sdy-li; Perm	F 36; ⅜"	35.5	Ant; geol	Substantial producing area anticipated.
		WEST TEXAS—New Oil Pays									
Ector	Goldsmith	Stanolind et al's C. Schartbauer 3-Q, e ne sw psl 12, blk A, n edge of San Andres prod.	5-31-45	3-30-46	9155	6090- 6290	Clear Fork (Tubb) li; Perm	F 398; ¼"	40	Ant; geol	Forerunner of impt dp pays development of lge struct. Pre-Perm prod reasonably certain on top of struct. Twin drlg would be required.
Ector	N. Goldsmith-Devonian.	Standolind's Grisham-Hunter Corp. 1, c sw sw T&P Ry. 10, blk 45, T-2-N, offsetting 4400-ft San Andres prodtn; old failure dpnd frm 6499 ft. (OWDD).	9-24-43	4-21-46	7956	7919- 7956	Devonian chrty-li; Devo	F 445; ¼"	43	Ant; geol	Devo will surpass reg Perm pay in prodng ar; correlates 63 ft high to 10,290-ft Ellen failr 1¼ mi w by s.
Ector		Phillips Pet Co. et al's Eidson-Scharbauer Unit 1, 1997 ft snl and 1827 ft wel PSL 25, blk B-15, ¾ mi w of n end of Penwell fld.	12- 3-45	4-20-46	9020	8920- 8950	Ellenburger dolo; Ord	F 1065; ½"	43.5	Ant; geol-geop	Major drlg program to flw if dp tests starting in old sect of regular Perm ar prv prodtv. Dp strk reached wtr in drlg 132 ft in Ellen; est 100 ft of pay. 5 cos. pooled lses to dr disc.
Winkler	Keystone-Devonian.	Stanolind P & G Co.'s Mack Taylor 1, Tr. No. 2, c sw sw psl 8, blk B-2, 1 mi e of Ellen prod.	5- 8-45	4- 6-46	10280	8040- 8135	Devonian chrty-li; Devo	F 617; ¼"	32	Ant; geol	Flwng prod from Devo passed up by numerous wells in Ellen prodng sector and will be tapped yrs hence. This outpost reveals Devo prod extends beyond e limits of Ellen, altho only 95 feet of Devo sect.
		UPPER TEXAS COAST—New Oil Pays									
Brazoria	Blue Lake	McCarthy O & G Corp.'s Turnbull et al 1, 675 fr nl 330 fr el 160-ac lse, Ger. Robinson Lge.	3- 4-46	4- 9-46	9367	8510- 8527	Frio sd; Olig	F 233; 2/64"	34.3	D; seis	.....
Hardin	Saratoga E. flk	L. M. Josey et al's Caswell Tr. Co. 2, 3000 fr prod., 915 fr n&wl 1255 fr el 147-ac lse, BBB&C sur.	3- 5-46	4- 9-46	5951	5849- 5865	Yegua sd; Eoc	F 128; ⅛"	39.8	SD; seis	Possible e ext fld.
Hardin	Silsbee, W	American Republic Corp.'s Ellery-Fee 1, 644.3 fr wl 2745.8 fr nl Jos. Ellery Lge.	1-14-46	4- 8-46	8143	7688- 7722	Yegua sd; Eoc	F 84; 2% wtr; ⅛"	41	Flt; seis	Probable sw ext to fld.
Matagorda	Sugar Valley	Skelly's Gregg Lawrence 1, 467 fr nw&swl 227.3-ac tr, P. Burnett-A. S. Sojourner sur.	2-12-46	4-13-46	10000	8972- 8997	Frio sd; Olig	F 168; 3/16"	32	D; rfl seis	.....
Wharton	Daboval	Floyd L. Karsten's Gus Lilie 1, 8½ sel¼ ETRR sur 73	2- 2-46	3- 7-46	7404	7126- 7150 7226- 7240	"T" sd; Olig "C" sd; Olig	F 54; ⅛" F 1.7 mln; ⅛"	42	Flt; seis	Unimportant—probable pinched off sect.
Wharton	Lane City	H. W. Snowden's H. C. Cockburn 5-A, 537-ac tr, S. Castleman sur, lot 5, blk 105.	3- 7-46	4- 5-46	5503	5345- 5390	U Frio sd; Olig	F 81; ⅛"	26.3	Flt; seis	Fld limited as defined by adj dry holes.
		UPPER TEXAS COAST—New Distillate Pays									
Matagorda	Blessing	American Liberty's Dela Braden 1, 708.5 fr nl 768.5 fr wl lot 36, 100-ac lse. (OWDD).	10-25-41	4- -46	10149	8422- 8475	Frio sd; Olig	200; 7 mln; ¼"	51	Flt; seis	Originally a Texas Co. injection well.
Matagorda	Midfields	Sun's R. B. Trull 1, 660 fr n&wl 160-ac tr, I&GN sur, blk 6, 2087 e ne Strnadel 2 discovery.	2- 2-46	3-25-46	9202	9088- 9100	Frio sd; Olig	308; 3.8 mln; ⅛"	57.8	D; seis	Important additional pay sand.
		UPPER TEXAS COAST—New Gas Pays									
Brazoria	Blue Lake	McCarthy O & G Corp.'s Frank K. Stevenes et al 2, 208-ac lse, Geo. Robinson sur, 1227 e of Well 1.	12-23-45	3-11-46	10600	9028- 9040 8915- 8923	"T" sd; Olig "C" sd; Olig	F 4.5 mln; ¼" F 3.1 mln; ¼"	.....	SD; seis	Important disc in this relatively new fld.
Harris	Aldine	F. M. Cornelius' O. P. Hargrove 1, 466 fr n&wl 160-ac tr, E. Farias sur, 2000 s sw Browland 1, 5750 ne Phoenix Dairy 1 gassers.	2-20-46	4- 1-46	7542	7527- 7548	Yegua sd; Eoc	F 3.7 mln; ¼"	.....	D; seis	Opens up upper level for gas.
		UPPER TEXAS COAST—Gas Field Extension									
Brazoria	Angleton	Humble's Minnie W. Mettler et al 1-B, 1980 s of nl 990 e of wl lot 14, M. T. Cox et al sbdn Cloud sur, 1000-ac lse, 1 mi n ext.	10-12-45	4- 1-46	11597	10416-10440	Frio sd; Olig	F 1 mln; ¼"	.....	SD; seis	.....
		LOWER TEXAS COAST—New Distillate Pay									
Dewitt	Yoakum	Pure's A. F. Karl 1, (OWWO) 660 fr ne&sel 78.33-ac lse, John May sur, ½ mi s Rice 1, gas-dist discovery well.	11- 1-45	4-10-46	11334	8272- 8296	Wilcox sd; Eoc	F 36; 1.8 mln; 3/32"	51.5	Flt; seis	This was disc well for fld. Produced at 8669-70.
		SOUTHWEST TEXAS—New Gas Field									
Webb		Sun's Issac Hirsch et al 2, 2000 fr el 2700 fr sl sur 2030, 2880-ac lse.	11-24-45	4-15-46	7530	6905- 7020	Wilcox sd; Eoc	F 1.4 mln; 2/64"	.....	Ant; rfl seis	Unimportant.
		SOUTH CENTRAL TEXAS—New Oil Fields									
Atascosa	Jourdanton	Humble's A. N. Mourgund 1, 660 fr s&el 80-ac tr, Ed. Estes sur, ne of Humble's Schorsch 1, gas discovery.	1-17-46	4-15-46	7385	7362- 7385	Edwards li; L Cre	P 50; 22% wtr	34	Flt; seis	Unimportant.
Milam	Willow Flat	McCrary Oil Co.'s J. R. & M. A. McCrary 1, ne end NilesF. Smith sur, 1½ mi n Calvert fld., 560-ac lse.	3- 1-46	4- 1-46	2120	2095- 2120	Nacatosh sd; L Cre	P 95	36	Flt; grv	Unimportant.
		WYOMING—Oil Field Extension									
Fremont	Crook's Gap	General Pet. Corp.'s 72-19 Pat. sw ne ne 19-28-92w, 1 mi se ext.	.....	3- 9-46	5600	5218- 5254	Lakota sd; L Cre	F 200	.....	.....	.....
		WYOMING—New Gas Field									
Sweetwater		Texas Co.-Union Pacific R.R. Co.'s Unit 1, se nw nw 1-18n-98w 30 mi e of Baxter Basin.	.....	4-20-46	3831	3333- 3334	Lance sd; U Cre	F 5.7 mln	.....	.....	.....

[1] Characeter of producing formations abbreviated thus: ch, chalk; dolo, dolomite; li, limestone; sd, sandstone; sh, shale, ser, serpentine; cgl, conglomerate. Ages of formations abbreviated thus: Pleis, Pleistocene; Plio, Pliocene; Mio, Miocene; Olig, Oligocene; Eoc, Eocene; U. Cre, Upper Cretaceous; L. Cre, Lower Cretaceous; Jur, Jurassic; Tri, Triassic; Perm, Permian; Penn, Pennsylvanian; U. Miss, Upper Mississippian; L. Miss, Lower Mississippian; Devo, Devonian; Sil, Silurian; Ord, Ordovician; Cam, Cambrian.

[2] Barrels of oil per day (24 hr. rate), flowing (F), pumping (P), swabbing (Sw), or bailing (B); or million cubic feet of gas daily open flow capacity; size of choke given in inches.

[3] Type structure abbreviated as follows: Ant, Anticline; D, Dome; Fld, Fold or Folded; Flt, Fault or Faulted; M, Monocline; N, Nose; SD Salt Dome; Str trp, Startigraphic trap; Syn, Syncline; Ter, Terrace.

[4] Method of discovery abbreviated as follows: cd, core drilling; dr, drilling; geol, geology; geop, geophysics; grv, gravity meter; ran dr, random drilling; seis seismograph; sub, subsurface geology; sur, surface geology.

Requirements for Our
PETROLEUM ENGINEERS

By FRANK H. WILLIBRAND, General Superintendent of Production
Sohio Petroleum Company

FEW major industries have made such rapid strides during the past two decades along the road of technology as has the petroleum industry. Today, the petroleum engineer is an indispensable unit in the machine that carries this industry in all its branches to greater success and upon which the industry must depend more and more in the future, as its operating problems increase. Petroleum engineering is attracting more young men than ever before. Several leading universities which offer courses in petroleum engineering report an influx of students, especially among returning GI's, seeking to graduate as petroleum engineers.

This paper will endeavor to set forth briefly the requirements which employers consider most essential in the petroleum engineering graduates who enter the employ of the various companies. It will be limited to a discussion of the requirements in the field of petroleum production engineering as such. It does not propose to discuss the field of refinery and casinghead gasoline plant engineering and will refer only briefly to petroleum production research.

Engineering Trends

It might be well at the outset to review briefly the trends in petroleum engineering. In so doing, I have taken the liberty to draw freely from a paper presented by Eugene A. Stephenson, head of the Department of Petroleum Engineering, University of Kansas, at the Conference on Mineral Technology at the annual meeting at A. & M. College of Texas, June 27-30, 1938.

Roswell H. Johnson of the University of Pittsburgh first introduced petroleum engineering as a specific educational program about 1912 in that University's Department of Oil and Gas Production. He and his associate, L. G. Huntley, published a volume, "Principles of Oil and Gas Production." Stephenson states, "Although poorly organized, reeking with ambiguities, and insufficiently edited, this work nevertheless called the attention of geologists . . . Johnson and Huntley were consulting geologists . . . to many engineering principles which most practicing geologists knew existed, but had rarely utilized. Such ideas as 'well spacing,' 'following up a discovery,' 'graphic presentation of methods of computing the results of offset wells upon each other,' 'methods of bringing in a well,' 'management of gas wells,' 'secondary recovery methods,' 'reports upon oil and gas properties,' 'valuation of oil properties,' 'size and scope of oil and gas companies,' 'the natural gas industry,' constituted the major portion of this volume. Later volumes by Jeffery, Suman, Uren, Phelps, and Lake, by Harold, and finally by Cloud, have given us much better organized material."

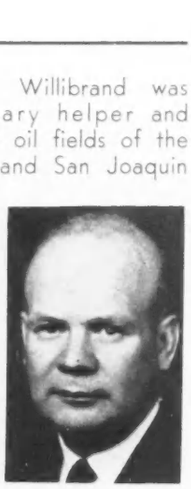
Stephenson further called attention to the fact that the early geologists were the butt of many drillers' jokes. The ridicule and derision to which the early-day petroleum geologists were subjected came about perhaps because the early well diggers realized that these boys had something on the ball and that there was slowly but surely a move on foot to eliminate the "by guess and by gad" system and substitute for it a system designed to ferret out necessary information through an orderly process and through a scientific approach. It was but natural for the geologists to recognize first the necessity of having a concept of petroleum production engineering. However, the growing variety and complexities of engineering problems led to a separation of the geological and engineering work to a point where today the fields of the geologists and the petroleum production engineers are reasonably well defined and understood. After the beginning made by the University of Pittsburgh, other colleges and universities soon established production engineering courses. Among these early schools were Oklahoma A. & M., Texas A. & M., Colorado School of Mines, University of California, Missouri School of Mines, Ohio State University, Stanford University, University of Texas, University of Oklahoma, and others. Today a large and impressive number of universities and colleges offers petroleum engineering courses leading to a degree in petroleum production engineering, or offers such work as an adjunct to mining, geological, civil and mechanical engineering schedules.

Time Wasting Courses

In the writer's opinion courses which aim to teach a student the difference between an ordinary ell and a street ell, a globe and a gate valve, a flat and a bull plug, a right and a left lay-line, how to tie some of the knots used around drilling rigs, and scores of similar problems are, to a great extent, a waste of the student's time and an improper use of the facilities of a college or university. Knowledge of this nature may best be had by actual contact in the field with the various pieces of equipment and material with which the field personnel in production operations work. The late Professor George, former head of the Department of Petroleum Engineering, University of Oklahoma, must have realized this since he required a certain amount of field work for graduation. Unfortunately, the depression of the early 30's made it very difficult for many students to find work during the summers of their university years. The requirement for field work was, therefore, waived in all too many instances. The dearth of engineering during the war years may have convinced many of the employers of neophite engineers that if they are to assure themselves an adequate supply of acceptable petroleum engineers, they must cooperate more fully with the schools to the end that henceforth it will be less difficult for the student engineers to find employment in the oil fields during their summer vacations.

Perhaps the most fundamental and most basic of all the requirements for a petroleum engineer is that he be able to write an English sentence correctly. It may be well to stress also the necessity for the young petroleum engineer to retain an understanding of the basic con-

FROM 1920-1927 Willibrand was employed as a rotary helper and rotary driller in the oil fields of the Los Angeles Basin and San Joaquin Valley of California. In 1927, he entered the University of Oklahoma and received a degree in Petroleum Engineering from this school in 1931. Since that time he has been in the Mid-Continent and Gulf Coast Oil Fields as roustabout, rotary helper, field engineer, farm boss, drilling superintendent, production superintendent and general superintendent, with the exception of one year when he was employed in Washington as a Senior Petroleum Analyst by the Petroleum Administration for War. He is Sohio Petroleum Company's Mid-Continent division manager.



Frank H. Willibrand

Presented at a joint meeting of the Oklahoma Society of Petroleum Engineers and the University of Oklahoma Petroleum Engineers Club.

cepts and fundamental principles of the physical sciences, especially in chemistry and in physics. I would emphasize that even though one may have, by diligent and persistent effort, completely analyzed a certain problem, and though one has by this analysis arrived at a correct solution, one must nevertheless reduce the analysis and solution to writing in its simplest terms in order that those who may not have the time and perhaps not the capacity to work out a detailed solution, may nevertheless grasp a comprehensive understanding from a careful reading of the briefed report.

The petroleum production engineer is required to associate with practically all types of personnel employed by the industry, and it, therefore, becomes necessary for him to cultivate a manner which will make it easier for him to get along with people. This getting along with people consists of more than simply saying yes to and agreeing with suggestions and proposals made by one's superiors. He must, with a tenacity approaching that of the proverbial bulldog, stick to those convictions which a cool and collected analysis of a given problem has led him to conclude are correct.

As mentioned earlier, the petroleum geologist was the butt of many jokes in the early phases of the industry and the petroleum engineer likewise suffered during this era of derision and ridicule. Most of this antagonism has disappeared, and it might be well to point out that the young petroleum engineer would do well to realize that even though the present-day foreman or farm boss may not have a college degree, he nevertheless has much information, knows many of the tricks of the trade, and perhaps knows less of what is not true and more of what is true than do some engineers. The young engineer will note that, at the present time, work in the oil fields is supervised by leaders rather than by drivers, as was the case some 25 years ago.

A list of the fields, each of which requires specialized knowledge and in each of which a vast amount of engineering still needs to be done, may be listed as follows:

1. Mud engineering.
2. Reservoir engineering.
3. Interpretation of electro-logs, gamma-ray logs, permeability profiles, etc.
4. Coring, core analysis, and the interpretation of analytical core data—both for primary and secondary recovery operations.

There are, of course, other fields in which the petroleum engineer might work to equal advantage. These four are mentioned as being the writer's notion of those most obvious at this time.

Mud Engineering. Great progress has been made in mud engineering, but when we realize that for many of the deeper wells in the Gulf Coast and other areas where lost circulation freely occurs, the total cost for mud admixtures on one well often exceeds $40,000, one can realize the immensity of the problem. A few years ago, the finger method of testing mud was perhaps most often used. This was followed by weighing a gallon of mud with a set of spring scales which often were very inaccurate; and a little later still, by using a hydrometer to determine specific gravity of the mud and by a Marsh Funnel to determine the viscosity. It was then thought that if the specific gravity and the Marsh Funnel viscosity were satisfactory, there was nothing more that could be done to improve the quality of the mud. Later, still, an understanidng of water loss, filtrate thickness, and pH value of the mud came to be generally understood and quite extensively used. Presently, muds of organic base, such as corn starch, are proving satisfactory in regions where more conventional types of mud are troublesome.

Reservoir Engineering. That is only one of many problems with which the reservoir engineer deals. The determination of optimum production rates, of withdrawal rates, and the effect of withdrawal rates on gas-oil ratios and bottom hole pressures, the effect of withdrawal rates on vertical water coning in the more permeable zones, interference tests, productivity indeces, are all considerations with which the petroleum engineer must constantly deal. After the reserves of a reservoir have been estimated, they must be revised from time to time if later information makes such revision necessary.

Interpretation of Electro-Logs, Gamma-Ray Logs, Permeability Profiles, etc. Electro-logs have been in use in drilling of oil wells for approximately 13 years. Had the event of the method of electrologging a well bore been delayed ten years, it is no idle statement to say that the United States would then not have been able to supply the requirements for crude oil products made upon it by the war. Much progress has been made during the past ten years in the interpretation of the phenomena attached to and connected with the use of gamma-ray emanations in the surveying of well bores. One of the service companies has brought into use a system whereby the permeability of any given part of a producing horizon may be determined by means of what is called a permeability profile, which is simply a graphic representation showing the rate of input obtained by pumping into an isolated section of the horizon. In spite of the electro-log, the gamma-ray log, the permeability profile, sample analysis on the part of the production geologists, and core analysis, production strings of casing are still set on wells from which not a drop of oil or a cubic foot of gas is produced and saved, and wells are still being drilled and called dry which later are made to produce oil or gas.

Coring, Core Analysis, and Interpretation of Analytical Core Data, Both for Primary and Secondary Recovery Operations. It readily can be seen that even though we improve our technique in core analysis to a point where there is almost universal agreement with the interpretation and conclusions reached from such analysis, that unless we devise ways and means whereby we may be assured of something which approaches 100 percent core recovery, we are still a long way from getting the kind of information which reservoir engineers and operational engineers require in their everyday work. Without becoming involved in the controversial issue as to whether we will run out of oil in the United States in the next 15, 50, or 100 years, it is nevertheless true that our rate of finding new oil is not keeping pace with our rate of consumption. This being true, it becomes necessary for us to pay more and more attention to secondary recovery, and while a vast quantity of oil has been recovered through primary operations without the assistance of detailed engineering work, very little in the way of water flooding is attempted until after a detailed study of a given reservoir has been made in order to determine whether such reservoir might respond favorably to water injection.

In conclusion, I quote again from Stephenson:

"It seems to be generally recognized that training in fundamentals must continue to receive greater emphasis, if we expect the products of our petroleum engineering departments to meet successfully so many different kinds of problems. This means, then, that less stress shall be laid on the purely descriptive material and more on the theoretical, scientific base.

"Engineering graduates become engineers, designers, executives, salesmen, etc., and as these grow in age, mellowness, and responsibility, they also acquire perspective. Usually these men have few regrets with reference to their collegiate training. Probably the most common complaint comes from the group which includes executives, and has to do with their lack of training in social science or the humanities. The group which includes those who have remained professional engineers, many of whom are also executives, usually reply, when asked to comment on desirable changes in their college training, 'Stick to the fundamentals of science and mathematics. If they fail to acquire the fundamental theories and principles in college, they will probably never master them. The so-called practical changes from day to day, while the fundamentals merely expand; comprehensive training in these should produce men of the necessary breadth.'

"Some of the best supplementary courses now given in engineering schools carry the title of 'the Dean's course.' Here men with ample backgrounds of experience, and with wisdom acquired from a multiplicity of contacts with humanity have an excellent opportunity to inculcate the essential concepts of mutual responsibilities in human relationships. Such courses belong with the fundamentals and should be required of all engineers.

"Regardless of formal curricula, the best teaching is dominantly inspirational and may well be described as that intangible part of personality which quickens the mind of impressionable youth and stimulates his latent desire to acquire knowledge, to do his work well and to carry his share of civic responsibilities."

Tennessee Map Issued

The Tennessee Department of Conservation, Division of Geology, has prepared and issued a composite structural map of northeast central Tennessee and a stratigraphic section across northeast central Tennessee showing correlation of Stones River rocks. Drawings and data were prepared by J. B. Collins and R. Bentall, and may be obtained by writing for Oil and Gas Investigations Preliminary Chart 3.

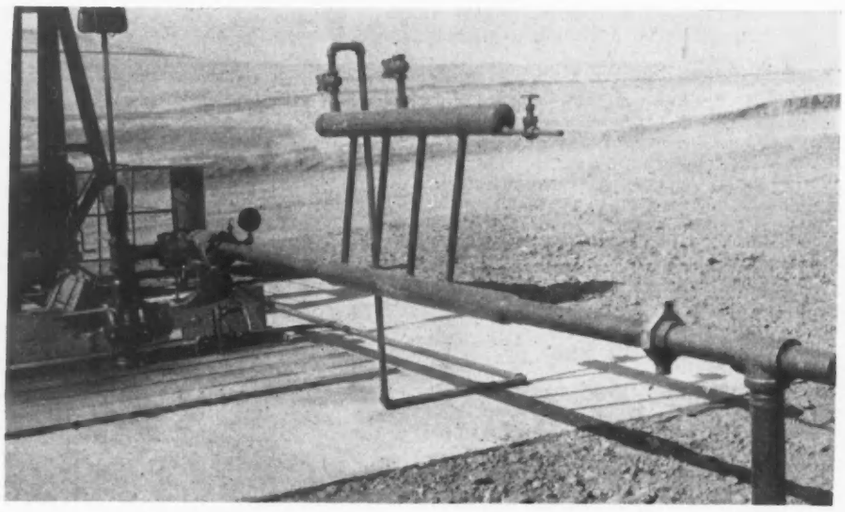
AIME Sectional Meet

A joint meeting of the East Texas Section of the AIME and the Shreveport Geological Society will be held in Shreveport, La., on May 31.

Gas Trap at Well Head Provides Pumping Unit With Fuel

In a field where oil produced contains little free gas for fuel purposes, the expense connected with bringing in outside fuel gas from another source is very heavy and requires tubular goods sorely needed for other purposes. It is in such a field that one company utilizes a method of extracting sufficient gas to operate the small pumping unit engine on the well, yet which requires no costly gas traps or similar separators. The oil lead line from the tubing head is of 3-inch pipe, and at a convenient point in the center of the well location or mat was installed a small shop-made separating device which has given excellent results in providing the necessary gas for the engine. Placed in the lead line is a 5-foot length of 4-inch pipe, the ends being swaged down to permit welding directly into the 3-inch line. Welded into this 4-inch pipe are four upright, evenly-spaced 24-inch lengths of 1-inch pipe. A 5-foot header of 4-inch pipe then is welded across the tops of the 1-inch pipes in the manner shown.

GAS TRAP



Oil and gas coming from the well enter the slightly larger section of lead line where expansion makes possible the release of some of the free gas. This gas then rises through the several 1-inch pipes and enters the 4-inch header above. At one end of the header is connected the pipe and fittings leading to the engine, and a similar valve is mounted in the center of the header for use on other installations that subsequently may be installed at the well site. A bleeder valve is placed in the other end of the header for draining off fluid that may collect in the upper section of the separator.

The entire device is simple and easy to construct, and requires a minimum of materials. It may be assembled and welded together as a unit in the shop, then brought out to the field ready for installation in the lead line.

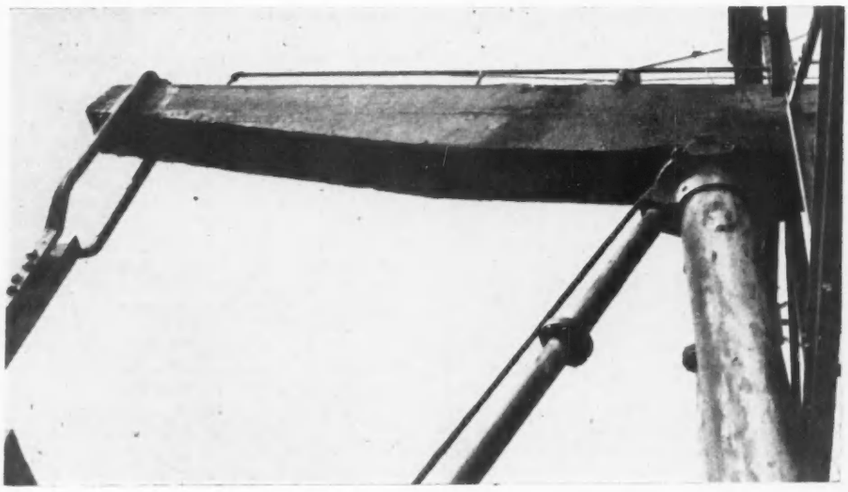
A home-type pressure regulator may be required at the engine in cases where the well head pressure is excessive.

Lubricator Mounted on Beam Assures Flow of Oil

In order to assure that a small but steady stream of lube oil reaches the several important bearing points on the walking beam, one operator utilizes a small pressure lubricator which is mounted atop and near the center of the beam. The pump arm of the lubricator is mounted so that it overhangs the side of the beam. This permits clamping a light tie-rod to it, the other end of the rod being secured to any convenient point on the Sampson post or its bearing plate. Lengths of small copper tubing conduct the lubricant over to the several bearings on the beam.

LUBRICATOR

Easy to regulate simply by proper positioning of the clamp on the pump arm, the entire system is very simple to install and gives trouble-free operation. The pumper need check the lubricating system less frequently due to the larger capacity of the reservoir.



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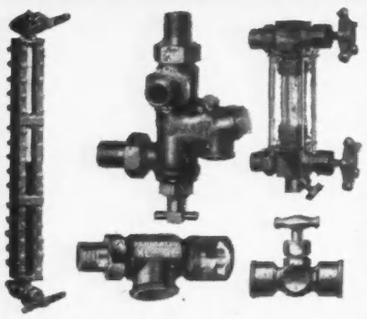
PRODUCTS



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See Pages 2450 to 2455, Composite Catalog

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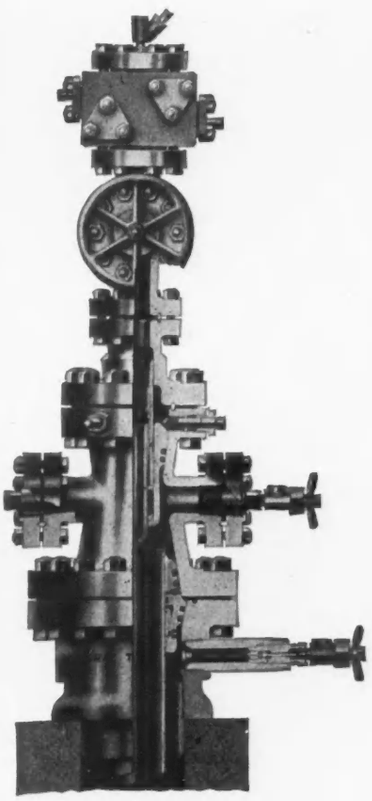
SIMPLICITY is the first requisite of well control



Complete Well Head Assembly equipped with Composite Manifold, Valve Removal, Installation and Removal.

The better design accomplishes its purpose with fewer, rather than more parts

Because simplicity, the fewest number of the highest quality parts, is the first requisite of well control, this means taking from, rather than adding to equipment. The organization which actually succeeds in finding a solution to the problem of well control must concentrate its efforts on the development of control, rather than on the sale of equipment. As it sells less equipment while performing the job with safety and efficiency, its contributions and service are of greater value.

For example, certain packers, equipment used for control, actually result in well control *without control* until coordinated with other control equipment to permit their installation with control. Blowout preventers, master valves, tubing and casing hangers, seals, etc., essential equipment for use in well control, result in well control *without control* until coordinated to permit their assembly and use with control throughout their entire period of usefulness, and their disassembly with control upon completion of their operating function.

Only by such coordination can simplification, the fewest number of the highest quality parts, become a reality. Only through this process of elimination, the ability to assemble and disassemble the equipment with control, can a solution to the providing of well control with control be found. There is no gap in control when you use Gray Systems of Well Control.

The whole is greater than any of its parts. The better design accomplishes its purpose with fewer, rather than more parts.

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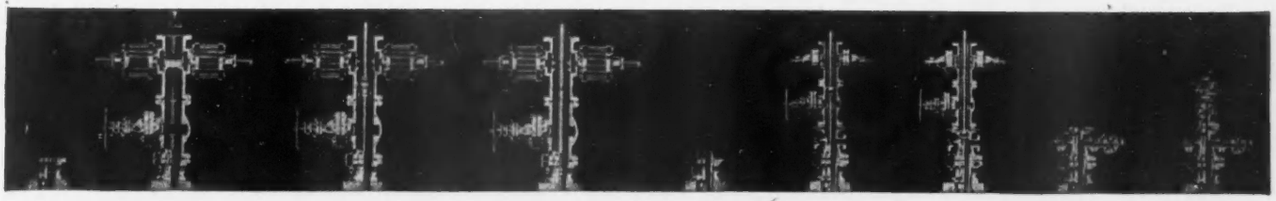

Casing Head Attached | Drilling | Running Casing | Casing Landed | Drilling Control Equipment Removed | Drilling-in and Running Tubing | Tubing Landed | Control Equipment Removed | Manifold Attached

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PRODUCTION HINTS

Pulling Unit Tie-Downs Simplify Setting Up

TIE DOWNS

Exact positioning of the pulling unit is unnecessary when using the simplified means of anchoring the rear of the truck which was devised by one producing company. Spanning the rear of the unit, and passing through holes in the outer ends of the drawworks base, is a single piece of drill pipe, each end of which is fitted with a device as shown which allows the attaching of a bolt and heavy chain. Both the pipe and the flat square piece of steel through which the bolt is run are rotatable on opposite axes which in effect creates a universal joint to compensate for slight mis-alignment of the truck in relation to the heavy steel anchor loops buried in the concrete derrick floor.

The short length of heavy chain which is attached to the lower end of the tightening eye-bolt passes down through the anchor loop then up to a slotted lug welded to the side of the unit. Ample threads on the bolt permit the chain to be hooked into the nearest link on the slotted lug, after which the heavy nut atop the universal joint plate is tightened with a wrench.

Oil Rag Container Reduces Fire Hazard

LEASE SAFETY

The danger of fire caused by spontaneous combustion is ever present at the average tank battery where oily wiping rags and other oil covered material are likely to burst into flame at the least expected time unless properly handlel. One producing company has adopted a system whereby the pumpers or gaugers, upon leaving the tank battery, are required to deposit oily rags in a special covered metal container located conveniently beside the tank stairway. The container is a common size tall garbage can which rests on a platform inside a framework made of ½-inch pipe. Above it is a simple roof made of two sheets of light steel, the front one being hinged, as shown. This hinged portion is connected to an arm and long steel rod, the latter being secured at the bottom to a foot-operated treadle.

Sheltered from rain, the container is easily accessible, is a constant reminder to field personnel regarding safe disposal of rags, and when full, the can may be removed easily for emptying.

CELLAR VIEWS—1946 STYLE

The ratio of blowouts to wells drilled should continue on the downward trend in '46, for more and more operators are replacing their obsolete and inadequate drilling control units with "QRC" Blowout Preventers . . . Cameron's greatest achievement in a quarter-century of leadership in drilling control equipment.

No other drilling control unit offers so many mechanical refinements as does the "QRC" Preventer: Quick Ram Change—the largest size requiring only a few minutes, a higher ratio of closing pressure to well pressure—8 to 1 as compared to 3 to 1 on earlier models, a bypass below the rams which utilizes well pressure to aid in the ram closing operation, low overall height and less weight which facilitates transport and assembly in the field, and 10,000 lbs. test pressure models in 6" and 10" sizes.

Add to these new features such time-tested ones as: Patented self-feeding ram packing, self-centering rams, pressure-operation by remote control and numerous others which have been proven for years on early models, and the reason for Cameron's continued leadership in this field is apparent.

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Crude Output Sets New High for Year; Gasoline Stocks Skid to 5-Month Low

Crude production topped the previous week's output to establish a new high for the year, while gasoline stocks were hitting a new year's low during the week ended May 18.

The production of gasoline and distillate fuel oil showed considerable increase during the week, but residual fuel output continued to slump. Despite this further cutback in residual fuel oil, its stocks continued to accumulate as did the lighter fuel oil stocks. These trends were revealed in the latest weekly bulletin of The American Petroleum Institute.

Crude production in the U. S. averaged 4,751,000 barrels daily during the week. The previous high was reached the week before when production was reported to be 4,749,000 barrels daily. This figure was revised to 4,734,000 barrels, which was still high for the year. Current crude production is 116,000 barrels daily less than the output of the comparable period of last year.

Crude runs to refinery stills during the week dropped 64,000 barrels a day from the previous week's runs to the new figure of 4,756,000 barrels daily. These daily runs to stills are 195,000 barrels, or 3.9 percent, under the runs made during the same period last year.

The unexpectedly heavy postwar demand for petroleum products has not allowed crude runs to stills to go back to prewar levels. The runs during this week average 636,000 barrels daily more than the daily high for 1941.

Stocks of refinable crude stood at 221,615,000 barrels on May 11, according to the U. S. Bureau of Mines, a decrease of 296,000 barrels during the previous seven days, but 19,000 barrels more than were on hand May 12, 1945.

Production of gasoline, including natural blends at the refineries, totaled 14,198,000 barrels for the week, which is an increase of 295,000 barrels over the previous week's figure, but 1,131,000 barrels, or 7.4 percent, less than the output of last year's week. Gasoline, finished and unfinished, stocks were reduced 1,108,000 barrels during the seven-day period and now stand at 97,050,000 barrels, a new low for the current year. These stocks exceed those held a year ago by 8,517,000 barrels, or 9.6 percent.

Distillate fuel oil output was upped 173,000 barrels over the previous week's, and amounted to 5,595,000 barrels, which also tops the comparable week of last year by 414,000 barrels. Additions of 450,000 barrels were made to distillate fuel stocks, bringing them up to 32,186,000 barrels, an increase of 2,327,000 barrels, or 7.8 percent, over the 29,859,000 barrel inventory of a year ago.

Residual fuel oil production, reduced 304,000 barrels from the previous week's, amounted to 8,420,000 barrels, a drop of 1,005,000 barrels, or 10.7 percent, from that produced during the like period of 1945. Residual fuel stocks accumulated 867,000 barrels during the week and now stand at 41,875,000 barrels. This inventory represents an increase of 3,023,000 barrels, or 7.8 percent, over the 38,852,000 barrels on hand a year ago.

Trends of Operations and Changes in Stocks

Figures on crude stocks are from Bureau of Mines weekly reports; all others from American Petroleum Institute weekly reports, which are estimates on Bureau of Mines basis.

(All figures in thousands of barrels—add 000)

HIGHS AND LOWS OF RECENT YEARS

ITEM	Crude Oil Prod.		Runs to Stills		Crude Stocks		Gasoline Stocks		Gasoil and Distillate Stocks		Residual Fuel Oil Stocks	
	Barrels Daily	Week Ended	Barrels Daily	Week Ended	Barrels	Week Ended	Barrels	Week Ended	Barrels	Week Ended	Barrels	Week Ended
Highs:												
1941	4,337	11–22	4,120	10–18	266,187	3–29	99,727	3–29	[1]54,983	11–15	102,448	1– 4
1942	4,337	2– 7	3,961	1– 3	263,208	3–28	[1]109,281	3–14	47,861	11–14	95,857	1– 8
1943	4,436	11–13	4,331	12– 4	245,752	5–29	94,159	3–20	47,187	11–27	72,881	1– 2
1944	4,762	9–30	4,798	12–30	240,992	1– 1	89,162	4– 1	48,162	10–28	64,744	10– 7
1945	[1]4,944	7–14	[1]5,140	8–18	227,554	10–13	99,012	3–24	45,341	11–17	56,074	1– 6
1946	4,751	5–18	4,820	5–11	229,430	3– 2	105,233	2–16	35,199	1– 5	42,371	1– 5
Lows:												
1939	[3]1,601	8–26	3,125	2–18	[2]229,127	10–12	71,152	10– 7	20,722	4–15	105,397	4– 3
1941	3,364	1–11	3,490	1–18	240,399	11–15	79,923	10– 4	28,382	4–12	90,914	7–13
1942	3,297	7– 4	3,393	5–23	231,896	12–12	75,934	12– 5	29,240	4–25	72,962	12–26
1943	3,821	1– 9	3,579	3–18	232,191	1– 9	68,182	10–16	30,732	4– 3	57,596	12–25
1944	4,357	1– 1	4,228	2–12	220,258	9– 9	76,302	1– 1	30,232	4–19	49,737	3–18
1945	3,621	10– 6	3,409	10– 6	[4]211,813	8–25	70,791	10–13	26,483	3–17	38,548	5–26
1946	4,403	3– 9	4,498	1–12	218,193	1– 5	97,050	5–18	25,131	3– 9	37,289	4– 6

TRENDS OF 1945 AND 1946

Trends in Week Ended	Crude Oil			Gasoline		Gasoil and Distillate		Residual Fuel	
	Production Daily	Runs to Stills Daily	Stocks Week End	Production Weekly	Stocks Week End	Production Weekly	Stocks Week End	Production Weekly	Stocks Week End
1945:									
January 27	4,727	4,756	221,310	14,957	88,223	4,843	33,561	9,252	51,119
February	4,777	4,803	219,351	15,500	95,972	4,958	28,753	9,084	46,713
March 31	4,781	4,677	223,782	14,644	98,758	4,548	26,889	9,184	41,745
April 28	4,805	4,780	223,474	14,633	94,068	4,636	28,273	9,379	39,813
May 26	4,887	4,950	222,831	15,194	89,121	4,667	29,184	9,670	38,548
June 30	4,903	4,999	220,781	15,546	86,472	4,910	32,213	9,077	40,488
July 28	4,930	4,996	218,507	16,106	86,008	4,598	36,071	9,586	42,283
August 25	4,982	4,931	[4]211,813	15,986	84,693	4,960	39,782	9,356	46,201
September 29	4,357	3,812	222,387	11,913	79,552	3,940	43,689	7,047	46,853
October 27	4,273	4,838	224,230	15,530	74,335	5,159	43,472	8,691	45,943
November 24	4,469	4,648	219,363	15,681	83,184	4,802	45,258	8,800	47,474
December 29	4,474	4,729	218,918	14,546	95,205	5,055	36,651	8,765	42,447
1946:									
January 5	4,548	4,651	218,193	14,488	98,494	5,293	35,199	8,867	42,371
January 26	4,626	4,553	220,544	13,622	101,737	5,720	29,498	8,411	39,722
February 23	4,714	4,595	226,699	13,175	104,709	5,728	25,398	7,913	39,290
March 30	4,425	4,684	224,994	13,896	104,715	5,357	28,240	8,738	37,746
April 27	4,672	4,685	224,443	14,228	99,631	5,568	30,466	9,204	39,404
May 4	4,721	4,672	221,911	13,889	98,548	5,313	31,487	9,010	40,212
May 11	4,734	4,620	221,615	13,903	98,158	5,422	31,736	8,724	41,008
May 18, 1946	**4,751**	**4,756**	.....	**14,198**	**97,050**	**5,595**	**32,186**	**8,420**	**41,875**
May 19, 1945	4,867	4,951	[5]221,596	15,329	88,533	5,181	29,859	9,425	38,852
Change:									
In week	+17	—64	—296	+295	—1,108	+173	+450	—304	+867
In year	—116	—195	+19	—1,131	+8,517	+414	+2,327	—1,005	+3,023
In year	—2.4%	—3.9%	0.0%	—7.4%	+9.6%	+8.0%	+7.8%	—10.7%	+7.8%

[1] All time peak. [2] Lowest between January, 1922 and July 1, 1944. [3] Lowest since October, 1922 due to shutdown of six Mid-Continent states. [4] Lowest since December, 1921. [5] Stocks, May 12, 1945.

Oklahoma Operators Busy On Stripper Well Problem

The approaching deadline for stripper wells subsidy finds Oklahoma oil operators, congressional representatives, and the National Oil Conservation Committee busy seeking either extension of the June 30 termination, of a permanent price differential by legislative action.

In Tulsa John G. Catlett, general chairman of the National Oil Conservation Committee, has received a letter from Congressman George B. Schwabe, of the first Oklahoma district, to the effect that although Schwabe is against subsidies as a whole, he realizes that Catlett's group has a practical and reasonable question.

"It does look to me," he wrote, "as if your group has something that perhaps will be reasonable and practical. You may rest assured that I shall always be glad to do everything I can to assist in the continuation of production from our stripper wells."

Three governors, Robert S. Kerr of Oklahoma; Bailey of Arkansas, and A. F. Schoeppel of Kansas, have indicated that they are in favor of either an extension of the subsidy deadline, or legislative action which will insure a permanent price differential.

Thoughts on

THE INCREASING TEMPO *of* GLOBAL OIL ACTIVITIES

The war stimulated the lifting of horizons generally. Witness the accelerated international activities of leading publishers such as The Reader's Digest, Time-Life, Crowell-Collier's, Curtis, McGraw-Hill.

In the oil producing field, however, sights were raised before Pearl Harbor. The OIL WEEKLY's plans to expand and intensify its global services were deferred by the declaration of hostilities but were put into execution immediately after V-J day.

In November the first International Feature issue of The OIL WEEKLY was published. It has appeared the first Monday of every month ever since.

Significant of the attitude of global oil men toward these broadened services of The OIL WEEKLY is the fact that foreign paid subscriptions have increased over 60% since last December. From the summer of 1945 up to now the renewal of domestic subscriptions hit an all-time high.

We like to feel this reaction to be a "thank you" from oil men at home and abroad.

The OIL WEEKLY

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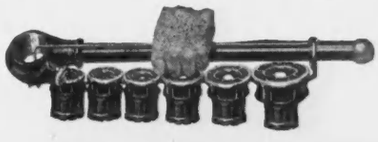

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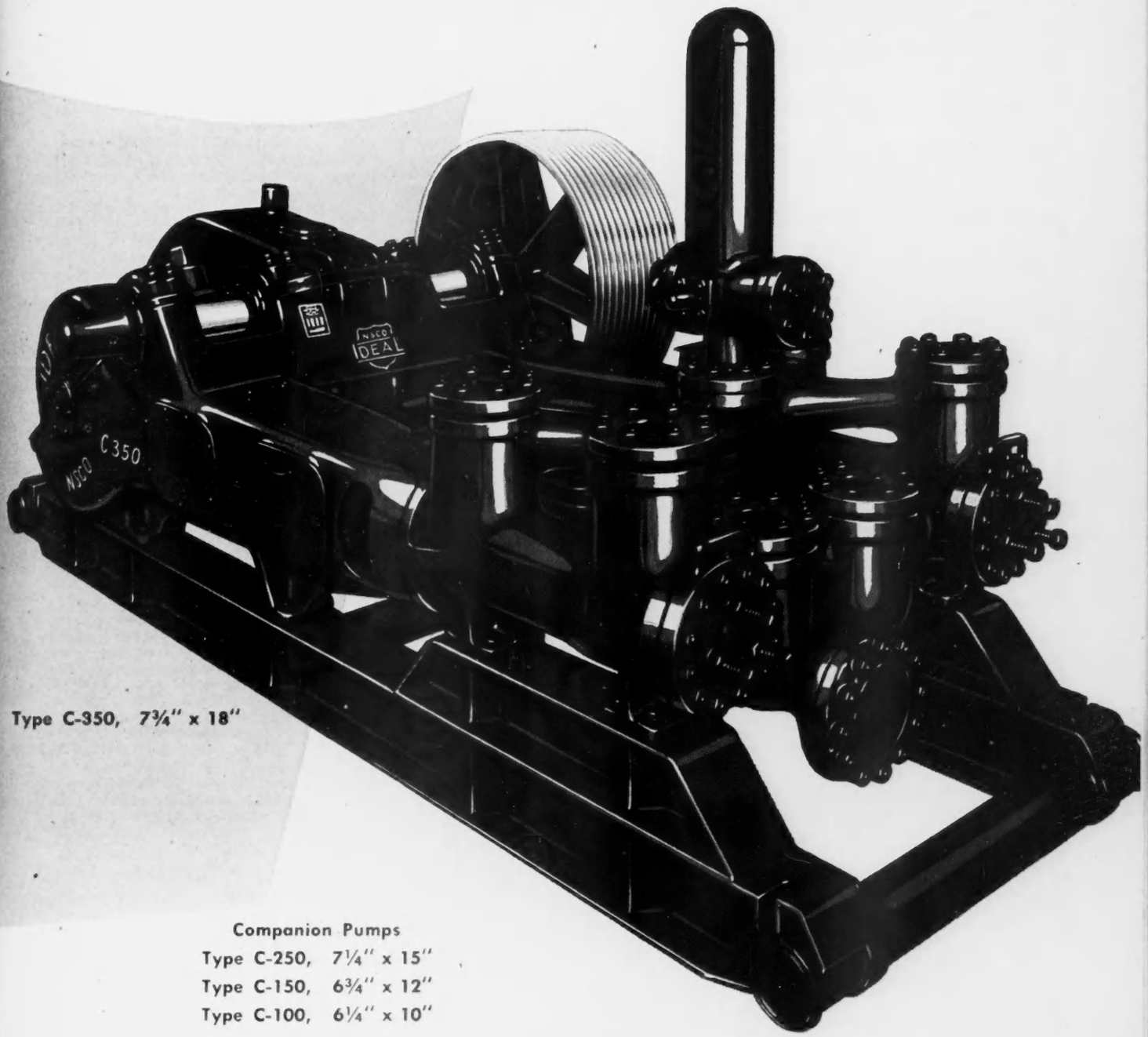

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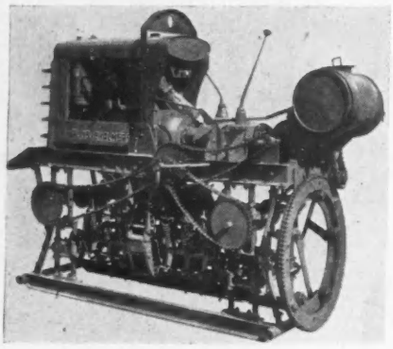

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PAGES 3079 THRU 3098 IN THE COMPOSITE CATALOG

FPC Approves Plan for New Gas Lines to Midwestern Markets

FPC has approved the $20,439,675 expansion program of the Natural Gas Pipeline Company of America, Texoma Natural Gas Company and Chicago District Pipeline Company to improve service and feed new markets in Illinois and Iowa.

The project calls for the construction by Natural of about 285 miles of 26-inch loop line at various points along its main system, about 52 miles of 24-inch loop in Illinois, 20 miles of two-inch lateral lines to new communities and 20 miles of 16-inch lateral line from Greenwood to Volo, Ill; the construction by Texoma of new compressor engines in its station in the Panhandle field and expansion of the dehydration and natural gasoline plant facilities there, and construction of 26 miles of 26-inch loop line, and the building by Chicago District of 23 miles of 24-inch loop paralleling its present Crawford line.

Cities Service Asks Authority To Move 61 Miles of Gas Line

Cities Service Gas Company has applied for FPC authority to move its 61-mile, 12-inch gas line from the Cunningham field to its Wichita, Kansas, compressor station, and relay it as part of a 64.5-mile line between the Phillips Petroleum Company compressor station in the Edmond gas field and the Cities Service compressor station at Drumright, Okla. Cost of the project is estimated at $1,075,890.

The company explained the new line is necessary to transport increased quantities of gas from the Edmond and other fields connected to its facilities to meet expanding demands in the Kansas City, Topeka and other areas served.

The line to be abandoned was constructed in 1940, and the supply of gas from the Cunningham area has diminished to the point where all available to the company can be handled through its eight-inch line to Hutchinson, Kansas.

Shell to Hike Capacity of East Texas-Houston Carrier

Shell Pipe Line Corporation will increase the capacity of the south end of its East Texas field-Houston ten-inch trunk line from 36,000 barrels to 42,000 barrels daily by adding pumping units to its Goodrich station, Polk County, and the installation of a new station about 20 miles north of Houston terminal.

The greater capacity will facilitate the movement of crude from the Mercy and Livingston fields, which have lines connecting with Goodrich station.

Sohio Builds Terminal for Crude from Tinsley Field

A 240,000-barrel oil terminal is being constructed by Sohio Petroleum Company at Mayersville, Miss. The terminal will serve as the loading point for Tinsley crude to be carried by a 43-mile, eight-inch pipe line now being built to connect the Tinsley field in Mississippi with the Mississippi River. This will permit the company to extend its water haul of crude oil by another 250 miles. The project will cost more than $500,000.

A portion of the pipe for the line is coming from a line now being dismantled in the Illinois field.

Two Companies Plan Increased Delivery of Gas to Michigan

Consumers Power Company and Panhandle Eastern Pipe Line Company have announced a joint program, involving a $20 million to $25 million program for increased delivery of Texas-Oklahoma gas to Consumer's Michigan outlets, numbering more than 240 cities and towns.

The plan centers on conversion of the Winterfield and Cranberry Lake shallow gas fields (1600-1700 feet) in north central Michigan for storage and construction of 150 miles of 24-inch pipe line from Panhandle's present Michigan terminal at Chelsa to the fields.

Dan E. Karn, general manager of Consumers, announced the two companies have negotiated a contract for a "25-year supply of gas, reported between 15 and 20 billion cubic feet annually. Consumers purchased 5½ billion cubic feet of gas from Panhandle in 1945, obtaining the rest of its total Michigan gas sales of 17 billion cubic feet from state fields.

The plan will involve the drilling of about 250 auxiliary wells in the two storage fields.

Stanolind Is Receiving Pipe For West Texas Field Line

Stanolind Pipe Line Company is receiving Pipe for its projected 35-mile, 16-inch trunk line outlet from the Wasson field to the Slaughter field, where connection will be made with its West Texas-Drumright, Okla., 16-inch carrier. The pipe was purchased in January.

The line to Drumright is currently handling 52,500 barrels daily, including common carrier runs, and is due to increase to capacity load of 66,000 barrels daily when the better grade of crude produced in the Wasson field becomes available.

Texas Permits Granted

Permits to drill 193 new wells in Texas were approved by the Texas Railroad Commission last week. There were 44 in North Texas and 64 in Southwest Texas. West Texas reported 34 permits, there were 18 from East Central Texas, 12 from the Gulf Coast, 16 from West Central and five from the Panhandle.

Proration Hearing Set

The Texas Railroad Commission has scheduled a hearing for June 19 at Austin to determine whether it would require an electric log of every well drilled in the state.

☆ California

Carneros Production Extended Northwest in Temblor Field

Carneros production extended northwest in Temblor field; Belridge deep test sets protective string at 10,000 feet; Texas to drill for gas in Humboldt County; big wells at Wilmington boost state production; Gardena wildcat near critical depth.

Kern County: Richfield Oil Corporation has extended Carneros production northwest in the Temblor field. Miller & Lux Fee 2 in 18-29s-21e was completed flowing in excess of 1000 barrels of 18.5-gravity clean oil. Total depth is 2787 feet with top of the Carneros placed at 2725 feet. Equipment is being moved to M. & L. Fee 3, approximately 450 feet northwest of No. 2. Richfield owns 160 acres in fee around the well.

The Carneros was first found productive in the Temblor field last March by Independent Exploration Company in Temblor 2, Sect. 17, a 1500-barrel producer. A small volume of production has been obtained from the Vaqueros around 1200 feet in this area for the past 40 years. Present production from the old sand is about 22 barrels daily from 16 wells.

In the Devils Den area, Barnsdall Oil Company's wildcat, Bates 1 in 20-25s-19e, is coring below 1250 feet. Cores between 1162 feet and present bottom were mostly fine gray sandstone with streaks of fine silty oil sand.

Belridge Oil Company's 62-W-33, deep test of the South Belridge field in 33-28s-21e, is drilling below 10,510 feet in shale after cementing an 8⅝-inch protection string around 10,000 feet. According to field reports, the casing would have been set on bottom had sufficient quantity been available.

Humboldt County: The Texas Company is preparing to drill Holmes-Eureka 3. Texas established the presence of gas in commercial quantities in this area several years ago. No commercially valuable oil deposits have been found to date, however. Oil and gas showings are found at several locations in southern Humbolt County.

Tehama County: The Superior Oil Company's gas test, Russell 1 in 12-24n-3w, has 7-inch casing cemented at 1716 feet. Electric log showed 2 gas zones between 1196 and 1664 feet and operator will gun perforate opposite these sands for a test. This well is about 3/5 mile south of Superior's Saldubehere 1 discovery well.

Kings County: Gas showings have been reported in Kings County Oil Company's von Glahn 1 in 4-23s-22e, in the Tulare Lake area. Crew is coring below 10,205 feet.

Orange County: D. D. and Dorothy Dunlap's Aldrich 3 in 18-6s-10w, between the Huntington Beach and West Newport Beach fields, has been completed flowing by heads, with no estimate available, but production is said to be substantial. Total depth is 3073 feet. Productive zone is believed to tie into the West Newport field rather than Huntington Beach. This well and Atha Exploration Company's recent completion in 13-6s-11w, currently flowing 475 barrels, have attracted considerable interest.

Los Angeles County: Recent completion of Long Beach Oil Development Company's S-3 in the 237 zone, Wilmington field, gives an idea of the excellent wells being finished in this zone. The above well, on completion, flowed 2195 barrels of 28.6-gravity oil through a 40/64-inch choke, with 490 pounds pressure on the tubing and 1650 pounds on the casing. As a result of this Wilmington development, California production is gradually rising toward 870,000 barrels daily and is higher now than at any time since the close of the war.

The Ohio Oil Company has completed a fishing job in its Gardena wildcat, Gardena Community Four 1 in 23-3s-14w, and is drilling below 10,250 feet. The next few hundred feet should determine the outcome of this well. A first well drilled in the area by Ohio produced oil but was lost because of an unsolved water problem.

☆ Oklahoma

Wilcox Sand Strike Swabs 232 Barrels of Oil in 16 Hours

Wilcox sand strike swabs 232 barrels of oil in 16 hours; new pay zone opened in Garfield County; Skelly completes Hughes County gasser; Wilzetta pool in Lincoln County extended; West Moore test flows; new pay horizon found in Ramsey pool, Payne County; Osage County test flows 80 barrels of oil in 18 hours.

Pottawatomie County: Completion tests are being made by J. F. Smith and Continental Oil Company on Klingensmith 1, SW SW SE 23-8n-2e, 3½ miles west of the Macomb pool. From all indications the well will make a good producer, for it recently swabbed 232 barrels of oil in 16 hours, from 2000 feet. Wilcox sand was exposed at 5637-39 feet, and a drill-stem test taken earlier at 5632-39 feet showed 2280 feet of 41-gravity oil.

Garfield County: A third production zone in the New Garber field has been opened by Cities Service Oil Company with Carl Ford 2, SE SW SW 31-23n-

Wells Completed in the United States in Week Ended May 25, 1946

Data preliminary and subject to revision. Revised and more complete data on all completions shown in monthly summary of drilling, published in second or third issue of each month. More detailed data on wildcats published in third or fourth issue of each month.

State or District	FIELD COMPLETIONS: New Wells *Oil	Gas	†Input	Dry	Total	Old Wells Deepened	WILDCAT COMPLETIONS *Oil	Gas	Dry	Total	ALL COMPLETIONS: This Week	Last Week	Cumulative: This Year	Last Year
Alabama	1				1						1		7	9
Arizona													1	
Arkansas	2				2		1		1	2	4	3	69	63
California	29	2		1	32	1			5	5	38	41	749	826
Colorado	1				1				1	1	2		46	11
Florida												1	8	7
Georgia									1	1	1		2	3
Illinois	22		1	5	28	2	1		10	11	41	56	886	641
Indiana	3			2	5		1	1		2	7	9	147	111
Iowa														1
Kansas	19	1		7	27	4			6	6	37	47	802	603
Kentucky	2			9	11						11	7	216	175
Louisiana	13	2		4	19		1		3	4	23	34	520	384
North Louisiana	5	2		4	11		1		2	3	14	24	272	119
South Louisiana	8				8				1	1	9	10	248	265
Michigan	6	1		5	12	1	1		6	7	20	18	279	294
Mississippi	1	1			2				1	1	3	6	89	150
Missouri													10	16
Montana	4	1		5	10				1	1	11		92	73
Nebraska														2
New Mexico	3			1	4	1			2	2	7	5	149	186
New York	15		10		25						25	25	442	388
Ohio	10	4		4	18						18	5	396	319
Oklahoma	32	4	1	10	47	4	1		9	10	61	44	1,002	909
Oregon									1	1	1		1	
Pennsylvania	27	8	15	3	53	1					54	46	1,200	1,127
Tennessee													2	2
Texas	99	7	1	22	129	4	3		23	26	159	155	3,192	2,862
E.Tex.Bor. Co.'s	1	1			2						2	4	65	31
Rest of E. Texas	8	1		2	11				3	3	14	11	220	82
North Texas	35	2	1	10	48				6	6	54	55	932	638
W. Central Tex.	2			2	4				2	2	6	7	232	183
West Texas	24			2	26		1		2	3	29	37	659	756
Tex. Panhandle	2	1		1	4	4					8	2	168	238
G. Coast, Upper	6			2	8		2		1	3	11	7	274	286
G. Coast, Lower	16	2		2	20				5	5	25	21	425	411
Southwest Texas	4			1	5				3	3	8	9	160	202
S. Central Tex.	1				1				1	1	2	2	57	35
Utah													2	
Washington									1	1	1		1	
West Virginia	1	8		1	10						10	18	286	300
Wyoming	1				1		1			1	2		57	59
Total U.S.	291	39	28	79	437	18	10	1	71	82	537	520	10,653	9,521

* Includes distillate wells. † Includes salt water disposal wells.

3w, which appears to be the best producer in the field. The test has been estimated for a flow of 40 barrels of oil per hour from the second Wilcox zone. Casing is now being run, with total depth at 5180 feet. Development in this vicinity has proved the New Garber field to be a "pimple" area, having been defined on the east and west by dry holes. Ford 2 is on the flank of the Nemaha ridge.

Hughes County: A well with an estimated showing of 15 million cubic feet of gas has been completed by Skelly Oil Company near the Yeager pool. It is the Horton 1, SE SW SE 23-8n-10e, which was drilled to a total depth of 3516 feet. Perforations were made at 3460-74 feet, where salt water was found. These were squeezed off and casing perforated again between 3340-3413 feet, with 178 shots. Location is a few miles west of the Greasy Creek district.

Lincoln County: Sam A. King, Tulsa independent operator, apparently is extending the old Wilzetta field with Earlabaugh 1, SW SE NE 34-13n-5e. Pay is from the Hunton lime, with the well flowing about 300 barrels of oil per day. King had the Misener sand at 4397-99 feet and the Hunton at 4299-4303 feet. With a total depth of 4303 feet, pipe was set at 4294 and drilled in. The well flowed into pits an estimated 300 barrels of oil per day with 10 million cubic feet of gas, but was shut down for tankage. Tubing is being run. King has a small spread of leases around the well.

Cleveland County: Another producer in the West Moore field appears likely at Mid-Continent Petroleum Corporation's Edgar Harris 3, SW NE SW 29-10n-3w. After perforating and loading the hole with 325 barrels of oil, the well flowed out 260 barrels of the load and was shut in. Total depth is 2828 feet in the Wilcox sand zone, and tubing will be run for further tests.

Payne County: A new pay horizon has been reached by Mid-Continent's Ramsey 4, SW SE NW 18-18-2e, Ramsey pool. The well, originally completed in 1938 for a potential of 8500 barrels of oil from the Wilcox sand, was deepened to the Second Wilcox sand zone, and was completed for a flow of 854 barrels of oil in 24 hours, 41.7 gravity, at a new total depth of 4802 feet. Old total depth was 4767 feet. This is interesting in that all production in the Ramsey pool has been from the First Wilcox.

Osage County: Continental's Osage Tribe 3, NW SW NW 24-23-3e, bailed and flowed 80 barrels of oil in 18 hours from Wilcox at a plugged-back depth of 3832 feet. Total depth is 3850 feet.

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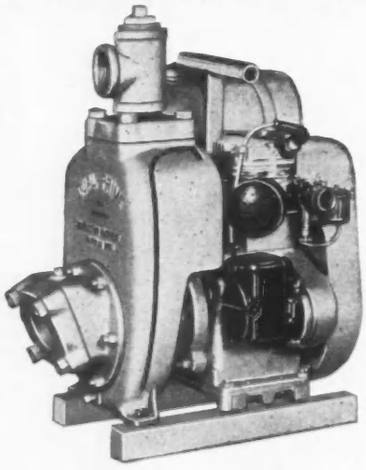

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☆ Kansas

Rooks County Test Promising; Skinner Simpson Project Begun

Rooks County wildcat promising; Sinclair Prairie starts second Skinner Simpson pool test in Barber County; Barton County well pumps 80 barrels of oil in 24 hours; Mid-Continent abandons Barton County test at 3692 feet.

Rooks County: Donald T. Ingling's Amos 1, NW NW SW 22-9s-8w, on a recent test had good porosity and saturation in the Arbuckle formation at 3599-3615 feet. Arbuckle was topped at 3599 feet, and operators are now running casing. The well is a mile southwest of the Dopita pool, and 6 miles northeast of the Vohs pool.

Barber County: Sinclair Prairie Oil Company staked Oldfather 2, NE SE SE 7-31-14w, the second start for the Skinner Simpson pool. Oldfather 1, recently completed, got a potential of 6909 barrels of oil a day when the Simpson formation was tested.

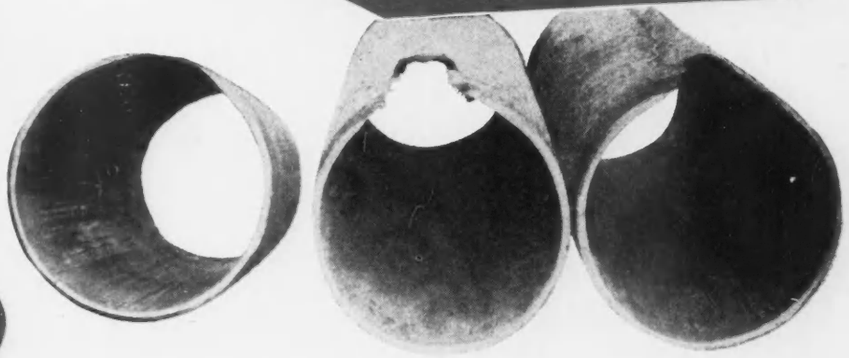
Barton County: Rockhill Stone & Gravel Company's Erhlich 1, NE NE NE 14-16-14, Trapp pool, pumped 80 barrels of oil the first 24 hours from a total depth of 3386 feet in the Arbuckle formation. Topeka was topped at 2848 feet; Lansing at 3150 feet, and the Arbuckle at 3360 feet. Previous to pumping the well showed 1000 feet of oil in the hole in 12 hours.

Mid-Continent Petroleum Corporation has abandoned as a dry hole Werhahn 1, NWE 31-19-15w, after running electric log. A drill-stem test was taken from 3692-3719 feet in the Arbuckle, topped at 3686 feet. The test is 4 miles from the Kruckenberg pool.

Indian Lands Offered

Sealed bids for oil and gas leases on Indian lands, totaling 33,800.52 acres in 171 tracts in five counties, will be opened at the Kiowa Indian Agency at Anadarko, Okla., June 12 at 10 a.m. Counties in which the lands are located include Comanche, Kiowa, Apache, Caddo and Wichita.

CASING TROUBLE always ends the same way



If the well is lost the cost is great. If not lost, necessary repairs mean costly delays. In either case, adequate use of Casing Protectors and Drill Pipe Stabilizers would have prevented the trouble. Every oil man knows the typical story, but just in case this ever-present danger may be overlooked, read the following:

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☆ West Texas

Ector's Third Devonian Strike Has Water After Brief Oil Flow

Ector County's third Devonian discovery shows water after brief oil flow; Ellenburger discovery in Penwell area quits producing account of water; Block 31 field extended more than mile southwest.

Ector County: John W. Murchison et al's T. P. Land Trust-Texaco 1, C SE NW T&P Ry. 7, Block 45, T-2-S, 3½ miles south by west of the TXL field, responded to an extended swabbing test by flowing 20 barrels of oil hourly for 2 hours from Devonian open hole at 8510-63 feet. It was shut in 12 hours, then failed to flow. Two runs of the swab were followed by a flow of 20 barrels of fluid hourly, averaging 11 percent salt water, with high brackish content. Tests are under way to locate the source of water. The showing of this wildcat virtually confirms the area for production, being the 13th Devonian strike. Rig has been skidded southeast to drill T. P. Land Trust 1, C SW SE Sect. 7 on American Republics Corporation's 80-acre lease that requires production by September 14.

Phillips Petroleum Company et al's Eidson-Scharbauer Unit 1, Ellenburger discovery for the northwest edge of the Penwell field, developed 36 percent sulphur water within 2 weeks after completion from perforations at 8920-50 feet. This zone was squeezed, and new perforations at 8965-70 feet yielded mud. Production is expected to be restored when perforations are made higher in the Ellenburger, topped at 8888 feet.

Dollar Hide Field: Union Oil Company's Cowden 2, north offset to the field's discovery and the highest structurally, flowed 805 barrels of 41.3-gravity oil, gas-oil ratio 1520/1, on natural test through ¾-inch choke from Devonian open hole at 7611-7804 feet. This third producer correlates 170 feet high on the Devonian. Magnolia Petroleum Company's Cowden 1-B, ¾ mile northeast outpost and a projected Ellenburger test, entered the Devonian at 7692 feet, or 50 feet low to the latest well, and tested dry at 7758 feet, and was drilling barren Devonian at 7850 feet.

Shell Oil Company's Nelson-Humble 1, wildcat near the west side of Andrews County, was making production test at 10,556 feet after recovering 1080 feet of oil and gas-cut mud when tester was used below 10,504 feet. This prospect previously made a small flowing well after acidizing a section at 10,384-488 feet in the Ellenburger, topped at 10,380 feet, while deepening failed to materially improve the output, or encounter water.

Reeves County: Argo Oil Corporation's Dora Roberts 1, prospective Basal Permian oil discovery that precipitated a large-scale lease play on the east side of the Delaware Basin, was idle for repairs at 10,853 feet in lime and shale. Shows have been somewhat nominal since deepening from 10,729 feet, where the well headed oil through drill stem.

Crane County: Humble Oil & Refining Company's Cowden 1-B, C SW SW Sect. 14, Block X, and 3 miles north by east of an Ellenburger failure on its 4560-acre lease, was running pipe while bottomed at 8707 feet in Devonian, topped at 7674 feet, or 1559 feet low to the failure.

The Atlantic Refining Company's University 1-J-31, C NE SW Sect. 40, extended the Block 31 field 1-1/16 miles southwest in making a dual completion, thus giving the area 4 two-pay wells and 2 Devonian wells. The southwest extension proves the Devonian for 2 miles and the Ellenburger for 1¾ miles along southwest-northeast trend. The new producer flowed 293 barrels of 44.6-gravity oil, with gas-oil ratio 1522/1, on natural test through ¼-inch choke from Devonian perforations between 8540-8900 feet. The well flowed 404 barrels of 45.8-gravity oil, with gas-oil ratio 682/1, through ¼-inch choke after using 1000 gallons of acid in Ellenburger open hole at 10,400-500 feet.

Midland County: Humble's Crespi 1, ¾ mile northwest of its Midland pool discovery and a failure in the Pennsylvanian, was running 5-inch liner at 11,620 feet to try for completion in the Devonian, topped at 11,400 feet. Drill-stem tests indicated production in the Devonian, which also showed gas in the discovery but failed to respond to acid.

Winkler County: The Pure Oil Company's Cowden 1, west offset to the Holt pay discovery for the Emperor area, appeared doubtful for production in drilling at 4950 feet, with nominal zones of porosity and saturation in the Holt series. Texas Pacific Coal & Oil Company's Brown-Altman 2, Lease 4, east offset to its discovery, flowed 64 barrels of oil, with gas-oil ratio 3400/1, on open tubing test of open hole at 4750-4805 feet.

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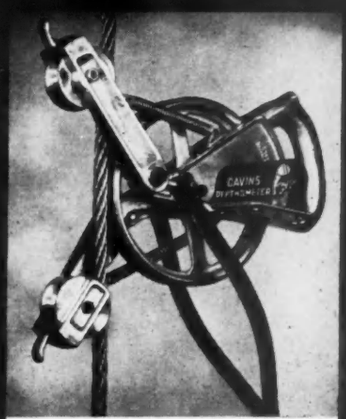

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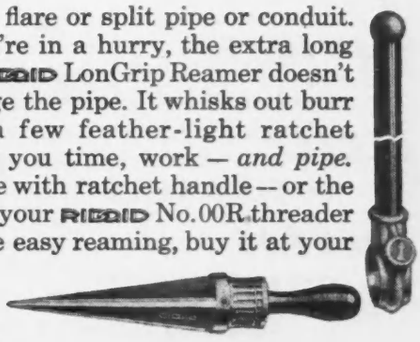

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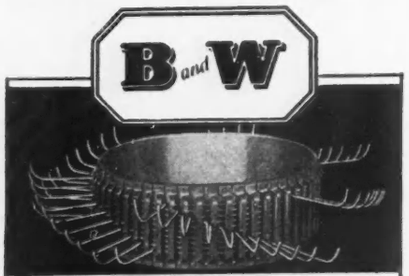

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the Wheeler field, have made application to the Railroad Commission to re-enter 4 Ellenburger producers and perforate opposite the Devonian for dual completion. Seven of the fields 16 Ellenburger wells are producing from both zones. Five tests, all outside locations, are currently active, and if these prove productive they will require a total of 10 offsets.

☆ Central West Texas

Taylor County Has Oil Strike; Eastern Offset Is Scheduled

Taylor County has oil strike; flush production developed by deepened gasser in southwestern Stephens County; Shackelford County Bend prospect is testing.

Taylor County: West Central Drilling Company et al's Murphree 1, SE SE SE S.P. Ry. 1, Block 9, and 1⅜ miles west by south of the Ingram 3-well pool, pumped 124 barrels of 40-gravity oil initial after using 150 gallons of acid in Cook lime perforations at 2625-29 feet. An offset to the east has been scheduled. This discovery reached the lime reef in drilling to 3063 feet. Owners include McElreath & Suggett, W. W. Harvey, W. E. Butler, Edgar Davis and George B. Rice.

Stephens County: Fred M. Manning, Inc.'s O'Connor 1, C NE NE T&P Ry. 52, Block 7, and 1½ miles northeast of production, flowed 40 barrels of oil hourly natural through ½-inch choke from open hole at 3396-3403 feet in the Bend, topped at 3307 feet. This wildcat was originally completed last January as a gasser from perforations at 3335-40 feet. Lone Star Producing Company's T. P. Land Trust 1, SWc S.P. Ry. 3, Block C, and 2 miles south by west, abandoned as a failure in 1930 at 3940 feet in Ellenburger, topped at 3932 feet, was rated at 25 barrels of oil and 750,000 cubic feet of gas daily from perforations at 3788-3800 feet. This reworked test was deepened at 4010 feet without results.

Shackelford County: Roeser-Pendleton, Inc.'s Lee-Shell 1-B, 3 miles southwest of Albany and between shallow pools, was showing some promise of making a producer after using 500 gallons of acid in open hole at 4458-72 feet in Bend, topped at 2784 feet. This wildcat headed oil briefly before running pipe.

R. H. Roark-L. F. Hooker and Jones & Stasney's Sanders 1, southwest offset to the Ellenburger discovery by Allied Oil Company in the Albany area, was setting machine to drill plugs from casing after flowing oil on drill-stem test of the Ellenburger zone at 4530-48 feet.

☆ North Texas

Knox Strike Excludes Water; Bateman Field Has Producer

Knox County's first discovery excludes water; second flush producer for west portion of the Bateman field; deep penetration of Ellenburger underway at Sivels Bend.

Knox County: Cities Service Oil Company's Mulkey 1, 2 miles south of Truscott and 10¾ miles from nearest production, swabbed 5 barrels of oil hourly after reperforating Basal Pennsylvanian at 6220-40 feet. Acid treatment is to follow. This wildcat headed oil from original perforations at 6225-40 feet, but water broke in after acid treatment and cement was squeezed to exclude lower water encountered in making unsuccessful test of Ellenburger at 6718-85 feet.

King County: Humble Oil & Refining Company's Bateman 21, northwest outpost for the Bateman Ranch field and second natural flowing well for the west extension sector, flowed 229 barrels on 16-hour gauge through 1-inch choke from perforations at 5139-95 feet, with additional pay logged in drilling to 5300 feet. Top of lime is flat with Bateman 20, which gave the area its first prolific well from broken pay at 5155-5240 feet.

Cooke County: Sun Oil Company and Standard Oil Company of Texas' Midkiff-Davis 1, 1⅔ miles east by north of the Ellenburger discovery for the Sivels Bend field and lower structurally, was drilling barren dolomite at 9390 feet without shows. It is slated to drill to water. Mid-Continent Petroleum Corporation's Field 1, F. Wilkerson Survey and 3600 feet west of production, cemented pipe at 7000 feet, with the hole bottomed at 7500 feet. It will perforate opposite nominal shows in the Beasley and Rasure sands.

Archer County: Grace & Grace's Edward's 2, Lot 16, Geo. C. Bruner Survey and 1½ miles northwest of Scotland, set pipe to test broken pay in Bend, topped at 5230 feet, and drilled to 5947 feet. It is an east offset to Edwards 1, which is awaiting pumping gauge after cleaning up collapsed casing.

☆ East Texas

South Tyler Field Has First Oil Producer from Paluxy

South Tyler field registers first oil producer from Paluxy; southeast outpost for Mount Sylvan field entered Paluxy series 102 feet low, and is likely to be failure.

Smith County: Phillips Petroleum Company's Hughes 1, M. M. Long Survey, established first production in the South Tyler deep field from the Paluxy series in flowing 3 to 4 barrels of 25-gravity oil hourly on preliminary test of perforations at 7477-88 feet. This flow confirms the showing passed up last January in drilling to 10,000 feet, where an unsuccessful production test was made of the Rodessa series. The company has 3 oil producers in the 9900-foot James lime zone, but the Paluxy may prove more attractive.

Ed Pace and Gordon McLean's Johnson 1, Andrew Kent Survey and 5900 feet southeast of the recent Paluxy oil discovery on the Mount Sylvan prospect, appears doubtful for production in coring barren sandy-shale at 7422 feet, with elevation 429 feet. This outpost entered the Paluxy series at 7369 feet, or 102 feet low, and had not encountered the first sand, although 53 feet in the Paluxy. At the present depth Johnson 1 is below the top of the water sand logged by Humble Oil & Refining Company's discovery.

The projected trend of production in the Mount Sylvan area is generally ac-

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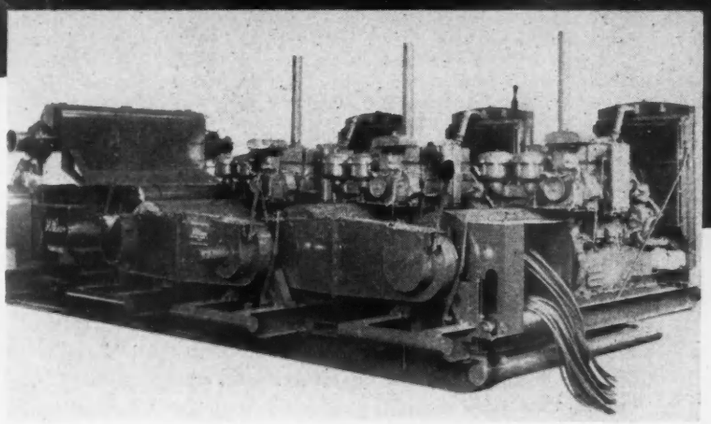

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cepted as being northeast-southeast. However, steep prices were paid for leases and royalties some 2 to 3 miles from the well site. Humble met competition in solidifying its block. Humble plans to erect a field camp near Mount Sylvan to house its workers, while Humble Pipe Line Company has projected a pipe line connection with its Hawkins-Sand Flat system.

Cherokee County: Hunt Oil Company's Andrews-Pure 1, Travis Peak prospect and 2 miles west by north of Jacksonville, showed water in the Woodbine, and was drilling Georgetown lime at 6105 feet.

Hopkins County: Magnolia Petroleum Company's Allen 1, Wm. B. Jordan Survey, and first operation for the company in the Pickton field, flowed 273 barrels of 49-gravity oil, with gas-oil ratio of 940/1, on natural test through 12/64-inch choke.

The production is from the Bacon lime at 7917-24 feet. The field has 24 producers in this zone, which averages 12 feet in thickness, and all but 2 are owned by Humble.

Harrison County: Rogers Lacy's E. Key 1, A. Crocker Survey, 15 miles south of Marshall and near the north bank of the Sabine River, was drilling below 3400 feet.

Shelby County: Humble Oil & Refining Company's Pickering Lumber Co. 2, Woodfin Survey, 1 mile south and west of the same operator's wet gas discovery in the Huxley area, was reported making good drilling time at 2895 feet. It will go to the Pettit at 6606 feet, and to the Travis Peak at 7800 feet.

Panola County: Humble's Gholston 1, Goodwin Survey, was completed and rated good for 10½ million cubic feet of gas from the Upper Pettit, and 12½ million cubic feet from the Lower Pettit. W. H. Mitchell's Frost-Cottle 1, MK&T Survey, was completed flowing 68 million cubic feet from the Upper Pettit, and 17 million cubic feet from the Lower Pettit. Paul Pewit's Carthage Unit 2 (well 1), Hampton West Survey, is a south outpost test for the Carthage field. The drill site falls 5200 feet from the west line, and 5100 feet from the south line of the survey. Kerr-McGee Oil Industries, Inc., filed permit to drill a Travis Peak sand test 8 miles south of Carthage, the site being Naomi 1, Edward Smith and John Lee Surveys, with projected depth 6250 feet.

Cass County: W. B. Hinton's J. O. Betts 1, A. S. Beard Survey, 4 miles southeast of Marietta, is drilling at 6105 feet in shale.

Demand Jump Is Shown By Bureau February Figures

Daily average domestic crude production jumped 94,000 barrels in February over January to reach the figure of 4,719,000 barrels, but daily average demand in the same period rose 105,000 barrels, to 4,580,000 barrels, the Bureau of Mines has reported.

With demand continuing under output, the industry was able to add about 139,000 barrels daily of domestic crude to stocks during the month and on February 28 had an inventory, domestic and foreign, of 231,827,000 barrels against 227,996,000 barrels January 31.

Crude runs to stills during February averaged 4,651,000 barrels daily, an increase of 131,000 barrels over the preceding month, but refined stocks declined by 1,500,000 barrels during the month to 226,759,000 barrels February 28, reductions of 3,500,000 barrels in stocks of distillate fuel oil, 600,000 barrels in residual fuel oil and 500,000 barrels of kerosine not being offset by a gain of 2,200,000 barrels in finished gasoline.

The total demand for motor fuel in February was 52,500,000 barrels against 56,700,000 barrels in January, the department reported.

The bureau reported that new supply in February was made up of 132,129,000 barrels of domestic crude, against 143,368,000 barrels in January; 9,011,000 barrels of natural gasoline against 9,882,000 barrels; and 240,000 barrels of benzol, unchanged, a total of 141,380,000 barrels against 153,490,000 barrels. Imports included 6,787,000 barrels of crude against 6,917,000 barrels, and 3,911,000 barrels of refined products against 4,510,000 barrels, making a total new supply, all oils, of 152,078,000 barrels against 164,917,000 barrels.

Exports included 1,997,000 barrels of crude, against 1,932,000 barrels in January, and 8,832,000 barrels of refined products against 10,671,000 barrels, with domestic demand including 47,889,000 barrels of motor fuel against 51,186,000 barrels; 9,608,000 barrels of kerosine against 11,176,000 barrels; 25,341,000 barrels of distillate fuel oil against 29,473,000 barrels; 2,275,000 barrels of lubricating oil against 2,689,000 barrels; 39,332,000 barrels of residual fuel oil against 44,966,000 barrels; 181,000 barrels of wax against 166,000 barrels; 611,000 barrels (equivalent) of coke against 766,000 barrels; 1,864,000 barrels of asphalt against 1,858,000 barrels; 59,000 barrels of road oil against 104,000 barrels; 6,254,000 barrels of still gas against 6,864,000 barrels 3,350,000 barrels miscellaneous products against 3,542,000 barrels, and 1,299,000 barrels in losses against 1,375,000 barrels, a total domestic demand of 138,063,000 barrels against 154,650,000 barrels.

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7–8	Kentucky Oil and Gas Association, Lexington, Ky., Hotel Lafayette.
13–14	Eastern District, Production Division API, Spring Meeting, Pittsburgh, Pa., William Penn Hotel.
17	FPC Gas Hearing, Washington, D.C. Court of Appeals, 5th and E.
27–28	Pennsylvania Grade Crude Oil Association, Annual Meeting, Pittsburgh, William Penn Hotel.
AUG. 8–9–10	Interstate Oil Compact Commission, Quarterly Meeting, Grand Rapids, Michigan, Pantlind Hotel.
OCT. 1–2	American Association of Oilwell Drilling Contractors, Annual Meeting, San Antonio, Plaza Hotel.
7–12	American Gas Association, Annual Convention, Atlantic City, N.J.
16–18	Texas Mid-Continent Oil and Gas Association, Houston, Rice Hotel.
28–30	Independent Petroleum Association of America, Annual Meeting, Fort Worth.
NOV. 11–14	American Petroleum Institute, Annual Meeting, Chicago, Stevens Hotel.

☆ South Central Texas

First Flowing Oil Well for Jourdanton Area Is Completed

First flowing oil well in Jourdanton area completed by Humble; Carrizo Park area wildcat has show of oil; Barnsdall abandons Dimmit County wildcat.

Atascosa County: The first flowing oil well in the Jourdanton area has been completed by Humble Oil & Refining Company. Alamo Lumber Company 1, 4100 feet southwest of the Schorsch 1 gas condensate discovery well and 2½ miles southwest of Jourdanton, flowed 141½ barrels of oil per day on potential test through ⅛-inch choke with tubing pressure 1975 pounds, gas-oil ratio 5091/1. The well was drilled to 7394 feet in Edwards lime and flowed from open hole with pipe set to 7390 feet. Humble's Moursund 1, a mile northeast of the Schorsch 1, was the first oil producer for the area and made a pumping well after a few short flows while testing.

Dimmitt County: Possible oil production for the Carrizo Park area has been indicated by Humble's Bradshaw 1, wildcat 3200 feet southwest of the Mógford & Kimble 1 dry hole and 3½ miles southwest of Carrizo Springs. On a drill-stem test at 2807-13 feet, 237 feet of oil and 5 feet of mud and water was recovered. The Bradshaw 1, in the T&NO Survey 15, is east of the Davis 1 discovery gas well which came in at 2710-17 feet.

After testing fresh water with no shows of oil and gas, Barnsdall Oil Company has abandoned Henrichson 1, 2 miles southeast of Valley Wells, Lot 5, Block 15, Good Luck Colony Subdivision, eastern part of the county. Tests were made in the Wilcox zone from 3993-4008 feet, in the Navarro at 5215-21 feet and at 5168-77 feet and 5161-71 feet. The wildcat was drilled to total depth of 5280 feet.

☆ Southwest Texas

Starr County Test Has Oil Show; Hirsch Field Well Shows Gas

Starr County wildcat has show of oil; second well in new Hirsch field of Webb County shows gas.

Starr County: A new oil field was indicated by W. H. Holland's Roos-Bennett 1, 12 miles east-northeast of Rio Grande City and between the Garcia and Boyle fields. Operators recovered 720 feet of 26-gravity oil on a drill-stem test at 2959-66 feet through ¼-inch choke with tool open 18 minutes. This wildcat, in Share 100, Porcion 93, is scheduled to 3400 feet. Operators cored ahead after making the drill-stem test.

Webb County: Sun Oil Company's Hirsch et al 1-A, second well in the Hirsch field and 3650 feet east-northeast of the Hirsch 2 gas discovery, will run electric log at 5100 feet and resume coring at about 5470 feet. A drill-stem test at 4030-83 feet recovered gas and 195 feet of fresh water with tool open 20 minutes. The Oil Field Nomenclature Committee of the South Texas Geological Society recently named the field "Hirsch" for Sun's Hirsch 2, discovery well for the field.

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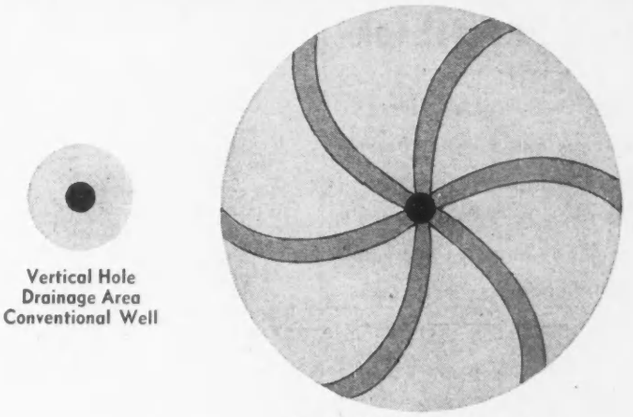

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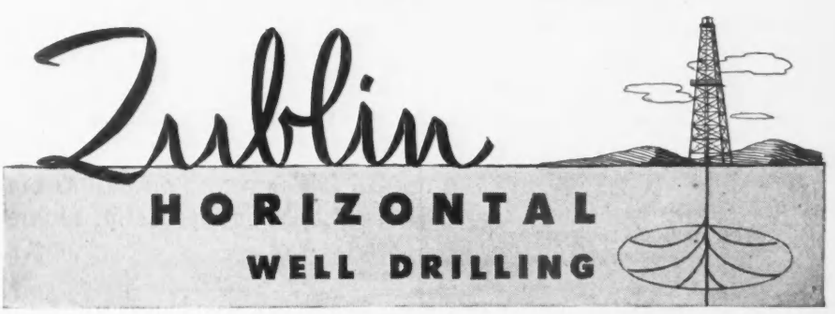

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☆ Lower Texas Coast

Gas-Condensate Field Opened In Brooks County by Shell

Gas-condensate field opened in Brooks County by Shell; Seaboard's Karnes City wildcat is duster; San Caja pool outpost to be completed as gas-condensate well in Wilcox.

Brooks County: Shell Oil Company's Cage Ranch 1, wildcat 3½ miles northwest of Barrosa, has opened a gas-condensate field with an initial gauge of 4½ million cubic feet of gas and 80 barrels of condensate per day through ¼-inch choke, tubing pressure 3800 pounds. The wildcat is producing from perforations at 8022-36 feet in the upper part of a thick sand section. Previous tests were made at 8080-98 feet for gas and salt water, and 8975-95 feet and 9005-25 feet for no show. Total depth is 10,009 feet with 5½-inch casing set to 9030 feet.

Karnes County: Seaboard Oil Company has a dry hole at Pau Banduch 1, wildcat 6 miles north of Karnes City and 10 miles northeast of Hobson field. Crews were tearing down the rig after drilling to a total depth of 4342 feet and scheduled to move immediately to a new location about 2000 feet away for another wildcat test. Banduch 1 is on a 79.6-acre lease, 11,000 feet northwest of the San Antonio River and 15,000 feet northeast of the northeasterly SW line of the A. Hernandez Survey A-4.

Live Oak County: Humble Oil & Refining Company's Hatchett 1, San Caja field outpost, will be completed as a gas-condensate well in the Wilcox zone. Located ½ mile east-northeast of F. M. Jones' Ezzell 2-C, discovery well for the field, Hatchett 1 was drilled to a total depth of 6995 feet in hard shale and casing was set to 6989 feet. Drill-stem tests at 6914-24 and 6924-34 feet recovered gas and condensate and another at 6934-44 feet recovered 720 feet of salt water, gas, condensate, and mud.

Pennsylvania Maps

Topographic & Geologic Survey Department of Internal Affairs is now ready to distribute Special Bulletin 3, "Oil and Gas Field Property Line Maps of the Hillards Quadrangle, Pennsylvania," compiled by R. E. Sherrill. It consists of nine maps on a scale of 2000 feet to the inch. This bulletin may be obtained from the Division of Documents, Department of Property & Supplies, 10th and Market Streets, Harrisburg, Pa., for $1 per copy.

Louisiana Board to Meet

The Louisiana State Minerals Board will meet in Baton Rouge June 25 and has advised all parties interested in having specific state lands offered for lease at that time to apply immediately.

☆ Upper Texas Coast

Oil Is Recovered on Drill-Stem Test in Wildcat East of Nome

Oil recovered on second drill-stem test at Sun's wildcat east of Nome; South Liberty pool well gets production from new sand in Cook Mountain zone; wildcat southwest of Madisonville makes deep tests.

Jefferson County: Oil and salt water was recovered on a second drill-stem test at Sun Oil Company's Texas Public Service Farms 1, wildcat 1½ miles east of production in the Nome field, John W. Kirby Survey, Abstract 586. Pipe was perforated with 40 shots from 6284-94 feet and tool was set on packer at 6258 feet, using ¼-inch chokes top and bottom. Tool was pulled after being opened for 22 hours and 11 dry stands, 18 stands of mud and salt water with some shows of oil and gas, and 39 stands of clear salt water were recovered. The first drill-stem test had similar recovery from perforations shot at 6333-43 feet.

Liberty County: A new sand in the Cook Mountain zone has been found productive in the South Liberty pool. On a potential test, Sun's Fee 12, on a 50-acre tract in the David Minchey lease, flowed 103.38 barrels of 37.2-gravity oil in 24 hours through ⅛-inch choke with 810 pounds pressure on tubing. With total depth at 4900 feet, pipe was perforated from 4585-4615 feet and had gas-oil ratio of 1291/1.

Madison County: West Production Company & Noranda Oil Company's Boring 1, wildcat 7½ miles southwest of Madisonville, Amy Boatright Survey, has been drilled to 12,536 feet and has made several deep tests without any shows. With 5-inch liner set on top of rat hole at 12,516 feet, perforations were made at 12,135-147 feet and 12,070-120 feet and tests at these intervals failed to make a show. These perforations have been squeezed and further tests will be made up the hole.

☆ South Louisiana

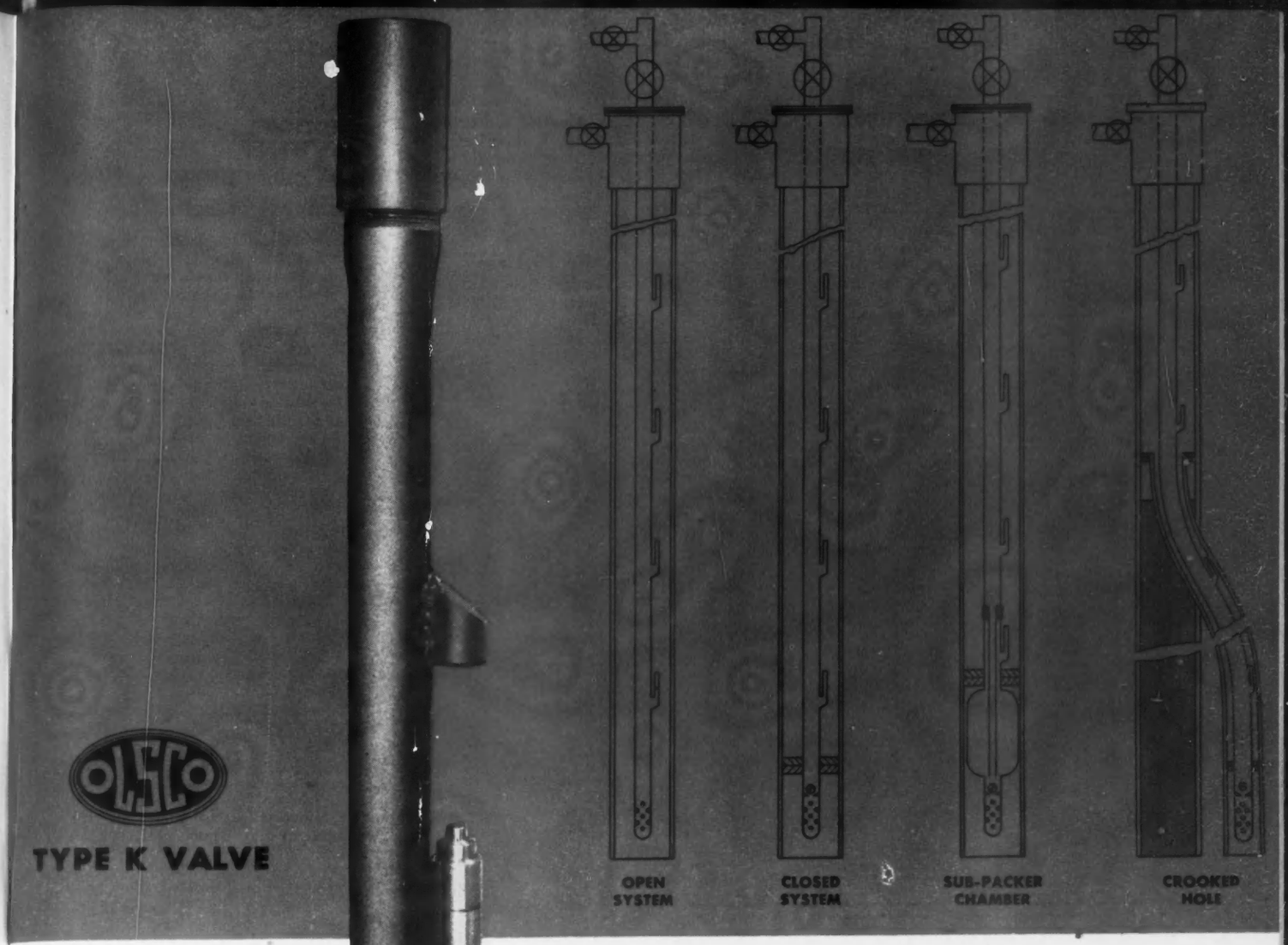
Egan Field Test Is Completed As High Gas-Oil Ratio Producer

High gas-oil ratio well completed at Egan; fishing job under way at Barnsdall's West Tepetate well; California Company gets production from new deep sand at Bayou de La Fleur; Humble abandons deep wildcat south of Bayou Carlin.

Acadia Parish: A high gas-oil ratio well for the Egan field has been completed at Sun Oil Company & Sohio Petroleum Company's Dailey 2-A, 30-9s-2w. The well gauged 85 barrels of 53-gravity condensate daily through 12/64-inch choke with gas-oil ratio 21,475/1, tubing pressure 2350 pounds. With 7-inch pipe cemented on bottom at 10,650 feet, pipe was perforated with 32 shots from 10,076-084 feet.

Jefferson Davis Parish: Fishing operations are under way at Barnsdall Oil Company's Joseph Landry 1, 36-7s-3w, West Tepetate field. The well blew out and bridged after drilling to 9376 feet, where an electrical log was run and sidewall samples taken. Operators were preparing to run 7-inch pipe when the well blew out. Top of the fish is located at 1685 feet.

Plaquemines Parish: Production from a new deep sand in the Bayou de La Fleur field of Jefferson and Plaquemines parishes has been established by The California Company's Brady et al 2, northeast of the No. 1 discovery well and across the county line in 34-16s-



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24e, Plaquemines Parish. With hole bottomed at 11,500 feet, pipe was set to 10,491 feet and perforated from 10,485-490 feet. Initial production gauged 260 barrels of 36.9-gravity oil daily through 9/64-inch choke with 2000 pounds flowing pressure on tubing and a gas-oil ratio of 1280/1. The discovery well, finaled 2 months ago for 300 barrels of 38.7-gravity oil daily from perforations at 9366-72 feet, also picked up the deep sand, which was logged from 10,415-442 feet.

St. Mary Parish: Humble Oil & Refining Company has abandoned Miami Corporation 4-H, wildcat test 1 mile south of production in the deep Bayou Carlin field. Spudded April 4, the wildcat was drilled to a total depth of 12,105 feet and an electrical log run to total depth before being plugged.

☆ North Louisiana

Failure in Richland Parish Is Offset by New Wildcat

Another Richland Parish failure offset by new wildcat; deep wildcat in Bossier Parish cores without shows: Sohio prepares to test wildcat in Tensas Parish.

Richland Parish: Another wildcat failure, C. W. Sharp Company's Cochrane & Franklin 1, 14-17-8e, abandoned at 4469 feet, was offset by a new wildcat location: Roy Fisher and A. W. Hutchins' Tensas Delta Land Company 1, 330 feet south and east of NWc NE SE 20-14-6e. Production will be sought to 4500 feet or the Tuscaloosa. The test is 2 miles southwest of George Schoonmaker et al's Gold Mine 1, 10-14n-6e, abandoned a year ago at 5166 feet without commercial showings. Tuscaloosa was logged from 3665 to 3675 feet.

Bossier Parish: Barnsdall Oil Company-Sohio Petroleum Company's deep wildcat, Carter-Burton 1, C NW NW 26-23n-13w, cored at 10,413-425 feet, recovered no showings of interest and is drilling below 10,530 feet.

Tensas Parish: Sohio is preparing to run another drill-stem test of the Massive Tuscaloosa at its wildcat, Biedenharn et al 1, 11-12n-12e. A previous test at 9714-24 feet, total depth, recovered 25 stands of salt water. Plug back was ordered.

Sabine Parish: Union Producing Company's Louisiana Long Leaf Lumber Company 1, 29-8-11w, Swolle area, is reported below 9553 feet in hard shale and lime.

Two wildcats will get under way soon in the parish: H. J. Kirk's Long Bell Lumber Company 1, 4-6-13w, and E. W. Delbridge, Jr.'s Margaret R. Leach et al 1, 11-6n-12w, 6500-foot test.

Allowables Extended

P. J. Hoffmaster, Michigan supervisor of wells, has extended allowables in all fields on recommendation of the State Oil Advisory Board, following hearings with operators. Chief differences in present allowables center on the Deep River pool in Arenac County. Allowable was raised from 4000 barrels per day on a field withdrawal system March 1 to 80 barrels per well on an individual well system. Present field take is about 6600 barrels daily.

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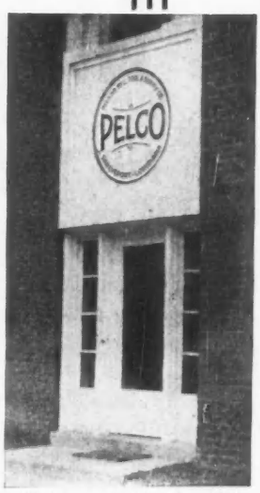

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☆ Arkansas

Nevada County Discovery Shows Encroachment of Salt Water

Oil discovery in Nevada County shows salt water encroachment; Village field edge test, first reported dry gasser, making distillate; Wesson area wildcat abandoned.

Nevada County: C. F. Steele et al's H. L. Waters 1, C N½ NW NE 20-14s-21w, pumped 30 barrels of oil during initial test and for a 3-day period to indicate a new oil discovery 2½ miles southwest of the Irma field. During the second 3-day test the well pumped 20 barrels of oil and 80 barrels of salt water. A squeeze job is planned. The well was testing from the Nacatoch sand at 1207-19 feet, with casing being both perforated and ripped. Total depth is 2263 feet.

Placid Oil Company et al will start work immediately at Mrs. Levi West et al 1, SE NE 19-14s-21w, 1 mile west of the Willisville discovery well. It will go to the Smackover, and is believed to have a good chance of production on a location based on seismograph work and core drilling.

Columbia County: McAlester Fuel Oil Company's E. A. Threadgill Estate B-1, NE SE 10-17-19, Village field, reported last week as a dry gasser, with little showing for a producer, has started making up to 80 barrels of 67-gravity distillate, through 10/64-inch choke from the Smackover pay. It was left open 48 hours. Gas-oil ratio is around 18,000/1. The well's total depth is 7426 feet. This pushes production ¼ mile northeast.

Union County: H. E. Wasson is preparing to deepen Union Saw Mill A-1, C SW SW NE 8-18-12w, 4 miles west of New London field, which was drilled more than a year ago to 2364 feet, where a good show was reported. Contract depth is 3600 feet.

Ouachita County: McAlester's C. M. Wesson D-1, NE SW NW 24-15-19, Wesson field, failed to produce when casing was perforated, at the 3100-foot level in the Travis Peak formation. Further tests will be made. Same operator's R. W. Wesson B-2, NE SE SE 24-15-19, officially gauged 184 barrels of 26-gravity oil, flowing through ¼-inch choke. Gravity is the lowest yet reported for the field.

Completion Near for Southern End of Warren Products Line

Work will be completed within 60 days on the 40-mile southern end of an 80-mile products line being constructed by Warren Petroleum Corporation between the Lake Creek field, Montgomery County, Texas, and port terminals at Texas City. A pump station will be built at Lake Creek and a booster plant at Norsworthy terminal on the Houston Ship Channel. Cost of the project is estimated at $2 million.

Oil Field Map Offered

Gulf Coast Engineering Company, 600 Ridge St., Houston, has finished a regional oil field map covering Louisiana, Mississippi, Alabama, Georgia, Florida and southern Arkansas. The map shows all producing fields, townships and ranges, counties, and county seats.

☆ Mississippi

Yazoo Prospect Has Oil Shows; Kings Field Gets New Gasser

Shows of oil reported in Yazoo County prospect; second gasser completed in Kings field.

Yazoo County: Southern Natural Gas Company's Gammill Investment Company 2, SE SW NE 6-9n-4w, wildcat, has tested shows of oil, probably from the Tuscaloosa, for the first encouragement in this area in many months. Cores from 6490-6576 feet recovered sand and shale with shows of heavy oil, while a drill-stem test at 6502-76 feet recovered 150 feet of mud cut with gas and oil in a 45-minute test. Driller is conditioning hole for further tests. In the Tinsley field Plains Production Company's E. W. Milner 6, NEc SW 7-10n-2w, is drilling below 4000 feet.

Warren County: Magnolia Petroleum Company's S. D. Finlay 1, SE SW SE 27-17n-4e, Kings field, has been completed as a gasser for the area's second producer. Productive section in the 1900-2000 foot zone was acidized and flow on open tubing was recorded at 11,650,000 cubic feet of gas per day. Magnolia's Ruth B. Pidgeon 3, SWc 26-17n-4e, Kings field, is drilling below 2250 feet. A drill-stem test of the field's productive zone at 1963-75 feet recovered slight shows of gas.

Marion County: Humble Oil & Refining Company's E. A. Ball 3, NWc 20-2n-14e, Hub field, has set casing to 10,200 feet in an effort to develop a second potential productive zone for the field. A drill-stem test at 10,123-130 feet recovered 165 feet of oil-cut mud and considerable salt water. Cores from 10,481-500 feet recovered sandy lime with no shows.

Adams County: Humble's Adams County Board of Supervisors 1, SEc 47-6n-1w, wildcat, is drilling below 8650 feet in its drive for the 10,000 foot zone. Last drill-stem test at 7300-20 feet recovered only mud and salt water. No shows have been reported. The Ohio Oil Company is building roads for Geo. W. Armstrong 1, SEc 12-5n-3w, which will explore the 10,000-foot zone. In the Cranfield field The California Company's Ella G. Lees 9, 45-7n-1w, which is exploring horizons far below present productive zones of the field, is drilling below 12,413 feet. Last cores reported at 12,112-118 feet recovered a thin section of sand and shale. A slight blow of gas had previously been reported in a drill-stem test of the Paluxy at 11,680-706 feet, the first such show to be reported from this zone.

Lamar County: Amerada Petroleum Corporation's Anton Vesely 1, SW NE 7-4n-15w, wildcat, is drilling below 7534 feet with no shows reported. Gulf Refining Company's Virgil Davis 1, NEc SE 7-1n-16w, Baxterville field, which previously had reported shows of gas and condensate from the Wilcox zone, is drilling below 7713 feet with no further shows reported in the lower horizons.

Jefferson County: Humble's Wince Patterson 1, 15-9n-1e, Fayette field, has set casing to 9711 feet and is preparing to test a drill-stem test at 9707-16 feet recovered 1600 feet of 36.4-gravity oil and cores of the same section recovered a good section of saturated sand.

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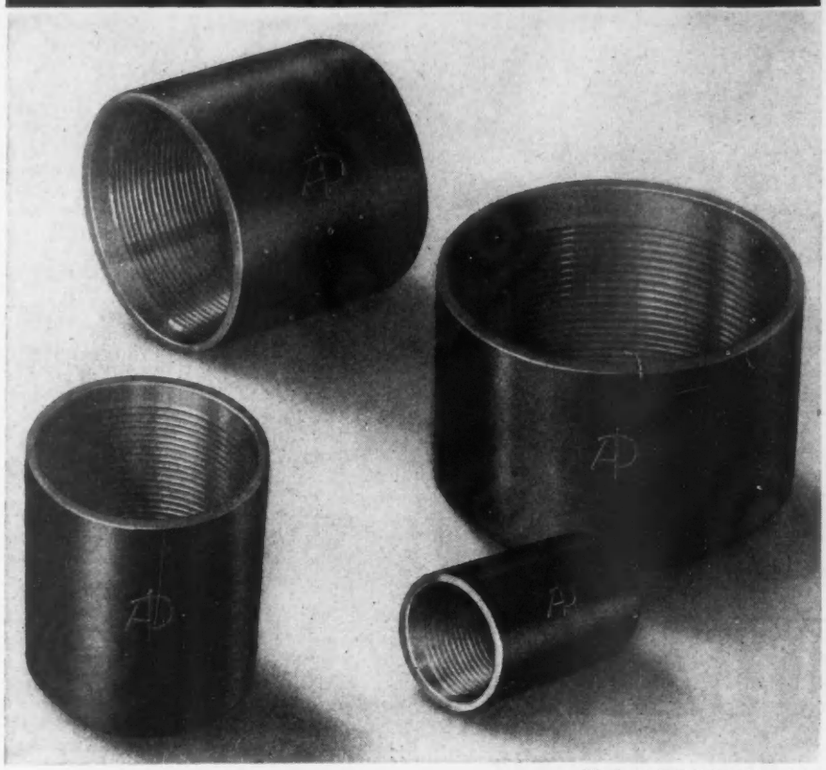

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☆ Florida

Monroe County Deep Wildcat Runs Tests in Lime Section

Deep wildcat in Monroe County starts tests; drilling on wildcats continues steadily and without shows; Georgia's only wildcat fails.

Monroe County: O. D. Robinson's State Well 1, NEc NW 29-59s-40e, deep wildcat, is running tests on lime section which had shows of oil at 10,339-375 feet. It is understood that the section will be acidized after which drill-stem tests will be made. Total depth is 12,053 feet.

Gulf Refining Company's State 1, SWc 2-67s-29e, wildcat, is drilling below 7355 feet in lime with no shows.

Hillsborough County: Humble Oil & Refining Company's T. S. Jameson 1, NE NE 7-31s-22e, wildcat, is drilling below 9210 feet after running electrical log. No shows have been reported.

Hernando County: The Ohio Oil Company's Hernasco Corporation 1, NWc 19-23s-18e, is drilling below 7760 feet with no shows.

Dixie County: Stanolind Oil & Gas Company and Sun Oil Company's Perpetual Forest 1, NW NW 5-11s-11e, wildcat, is drilling below 3020 feet. Cores taken in the 2000-foot zone recovered dolomite and anhydrite.

Osceola County: Humble's N. Ray Carroll 1, SE SE 10-27s-34e, wildcat which had drilled to 3853 feet, has plugged back to 1947 feet and drilled out to 3047 feet. Cores taken at 1927-52 feet recovered thin section of dolomite with fair porosity.

Georgia

James E. Weatherford's H. Wilkes 1, about ½ mile west of Higgston, Montgomery County, the state's only active prospect, has been abandoned for the second time after being deepened to 3434 feet. A drill-stem test at 3082-3118 feet recovered only mud and fresh water sand. No shows were reported.

Alabama

The Carter Oil Company's Rex Alman Unit 1, SW SE NE 4-10n-3w, in the eastern section of Gilbertown field, Choctaw County, has been formally completed with an initial production of 80 barrels of oil and 25 barrels of salt water per day. Well was swabbed in and put on pump. Carter has also made location for another development in Gilbertown, E. A. Rentz 1, in NE NW NE 4-10n-3w, to offset the Alman 1.

☆ Michigan

Rockford Field Given Its Best And Southernmost Producer

Rockford field, Kent County, given its best and southernmost producer; third successful completion registered in Van Buren County shallow area; Pinconning field, Bay County, has producer.

Kent County: James J. McGerry's Oom 1, SW NE SW 36-9n-11w, Rockford field, flowed 700 barrels oil the first 24 hours after acid treatment at 2224 feet from Traverse lime to throw new interest on the district. It is the best well drilled to date in the area, opened last year, and the farthest south, indicating previous development had been on flanks.

Montcalm County: McClure Drilling Company deepened Wicks 1, SW NE NW 36-11n-6w, Day Township wildcat, from 3338 to 3345 feet without logging additional pay or water formation. Test will be plugged back to 3340 feet and acidized. It swabbed 10 to 26 barrels natural from Dundee lime horizon.

Van Buren County: A new shallow drilling boom is in the offing with the third successful completion in the North Geneva pool. The discovery well, Ford Oil Company's Tolles 1, SW SE NE 10-1s-16w, jumped from 96 barrels a day to 32 barrels per hour when acidized with 200 gallons. Pay is at 1115 feet.

Bay County: Swan King Oil Company's Kurzeja A2, SE SE SW 35-17n-4e, Pinconning field, was estimated good for 50 to 60 barrels daily pumping from Dundee at 2927 feet. It showed 1400 feet of oil natural. The test is 1320 feet northeast of Shell Oil Company's 1944 discovery, a 50-barrel per hour natural well, and the first out of 11 drilled to produce.

☆ Illinois Basin

Stokes, Herald, Brownsville Pools, Illinois, Extended

Stokes field, White County, Illinois, gets ½-mile west extension; new pay added to Herald pool; Brownsville pool extended; East Mt. Carmel field, Gibson County, Indiana, being extended.

Illinois

B. M. Heath's Pyle Heirs, SE SE NW 12-6s-8e, White County, has extended the Stokes field ½ mile west with McClosky lime production from pay at 3065-75 feet. After 3500 gallons of acid, the well flowed 353 barrels of oil in 17 hours.

S. A. Gilpin's Bayley 2, SW SW NE 3-7s-9e, has added a new pay zone to the Herald pool, which is now producing chiefly from Cypress and Aux Vases sand. During a 1-hour drill-stem test, the well began flowing in 18 minutes from O'Hara lime at 3010-15 feet.

The Pure Oil Company's Ownings 1, SWc 1-6s-8e, is extending the Brownsville pool ¼ mile southwest. The well pumped 30 barrels of oil in 24 hours natural from Hardinsburg sand at 2660-75 feet.

Richland County: Pure's Gallagher 1-A, SW SE SW 12-2n-9e, was completed for 435 barrels of oil daily in McClosky lime to give the Gallagher pool a slight southern extension. Less than a mile now separates the area from the Calhoun pool, which recently received a northern extension.

Clay County: N. V. Duncan's Gibson 1, NW NW SE 2-4n-7e, 6½ miles northeast of Louisville, has given the area a new pay horizon in O'Hara lime at 2892-2902 feet. The well is pumping 12 barrels of oil hourly natural.

Indiana

Gibson County: Illinois-Mid-Continent Oil Company's Parkinson 1, SW NE NW 24-1s-12w, is extending the East Mt. Carmel field 1¼ miles northeast. The well flowed 1 barrel per hour natural from Bethel sand at 2065-95 feet. Operators are preparing to shoot.

☆ Rocky Mountain Area

Wyoming Tests Hold Attention; Majors Spud Montana Wildcats

Southern Wyoming wells hold attention; major operators spud Montana wildcats.

Oil lands on both sides of the Union Pacific railroad in southern Wyoming are getting a lively play highlighted by the recent major gas discovery in the Church Buttes wildcat joint test of Mountain Fuel Supply Company and the Union Pacific in Uinta County. Following completion of The Texas Company wildcat in the Table Rock area 2 months ago, Texas is drilling a second well in the new gas field between Rawlins and Rock Springs. The East Bailey Dome test of Wasatsch-Cameron is finding the Tensleep extremely hard and tight although cores show saturation. This wildcat is between Bailey Dome and Mahoney Dome. Wasatsch Refining Company's Caughlin 2, Rex Lake field, Albany County, has been completed as a small pumper.

An interesting deep test in Wyoming is the Shawnee wildcat of The Carter Oil Company, about 20 miles east of Douglas in Converse County. Drilling below 10,000 feet, reports indicate little promise although the area has produced some oil from shallow wells.

Montana

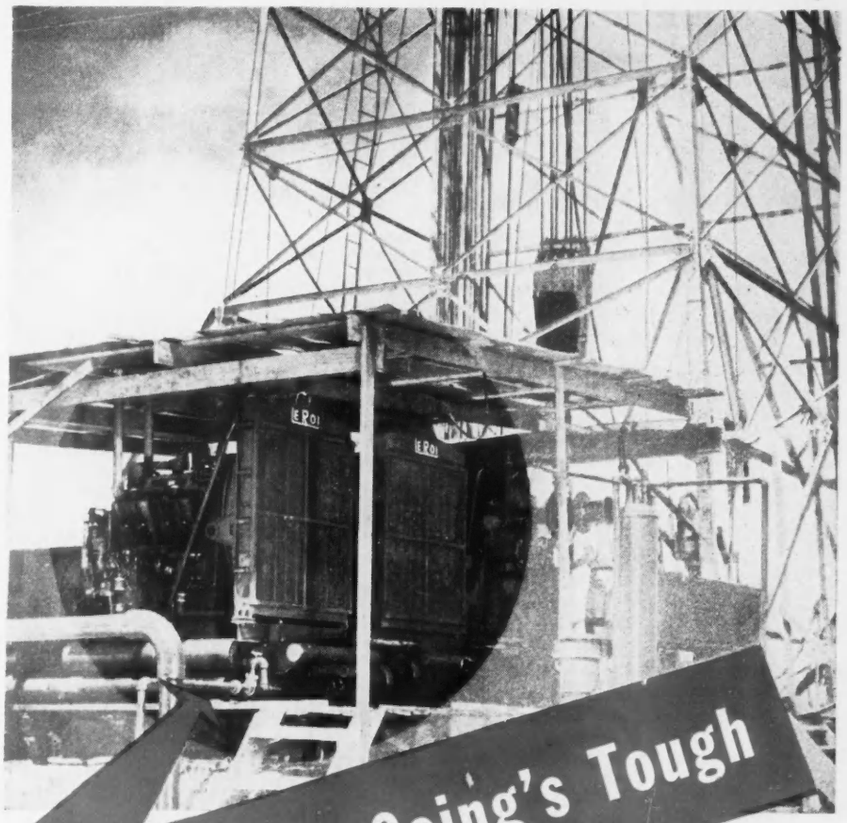
With nearly a dozen new locations during the past fortnight including some interesting wildcats, Montana oil activity is getting into full swing despite delays caused by cold, wet weather and shortage of drilling rigs and crews. Texas has spudded the first of its wells in the Mosby Dome area of the Cat Creek field, and the Farmer's Union already is testing the pay zone in the first of its wells in the choice location in Mosby Dome which was won after months of legal entanglements. Two producers on the East Dome have been reported, the best being Hanlon-British Dominion-Central Montana's Government 2, which was put on pump after swabbing 150 barrels daily. The East Dome discovery is putting 130 barrels daily into the tanks. The Pure Oil Company has spudded a wildcat in Custer County, southeast of Miles City.

Colorado

Colorado oil men are watching the test of the Weber sandstone at Iles Dome, which has shown oil and also some water. The fact that the Weber is productive at Iles Dome may prove to be the most important news of the year from Colorado oil fields, according to observers.

Rangely field production is still limited by lack of pipe line facilities and it is expected that Stanolind Pipe Line Company's line soon will be equipped with boosters to raise the daily capacity of the line from about 20,000 barrels to around 32,000. Meanwhile, wells are pinched in and operators are concentrating on exploratory and development work with full-scale production necessarily awaiting more satisfactory outlets.

Eastern Colorado, particularly in the area south of the Arkansas River centering in Baca, Bent, Otero and Las Animas counties, is the scene of the liveliest scramble for leases seen in the Rocky Mountain region in recent years.



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A pentane isomerization unit with a rated capacity of 2,540 barrels of isopentane per day. Accessory facilities include a boiler plant and three buildings with a total floor area of approx. 5,800 sq. ft. Area of site approx. 7.27 acres, leased.
Storage tankage: Atmospheric: 40,000 bbls.;
Pressure: 60,000 bbls.
Texas City Terminal R. R. Co. has spur track on site.

•

Duncan, Oklahoma (Plancor 1059)
Associated Refiners, Inc.

A refinery designed to produce 4,200 barrels of 100 octane gasoline per day; actual production has been as high as 5,100 barrels per day. Can be converted to the production of commercial grade gasolines. Area of site approx. 80 acres. Major functional units with approximate capacities are:

1. Two-stage Fluid Catalytic Cracking and Gas Concentration Unit. 10,000 barrels per day virgin gas oil to first stage.
2. HF Alkylation Unit. 2,200 barrels of aviation alkylate per day.
3. U.O.P. Isomerization Unit. 250 barrels of isobutane per day.

Storage tankage: Atmospheric: 580,000 bbls.;
Pressure: 27,000 bbls.
There are four railroad spurs on plant site.

CREDIT TERMS MAY BE ARRANGED FOR THE PURCHASE OF THESE PLANTS

OTHER GOVERNMENT-OWNED OIL REFINERIES ARE NOW, OR SHORTLY WILL BE, AVAILABLE FOR SALE OR LEASE

The War Assets Administration, a disposal agency, invites proposals for the purchase or lease of the above properties in the interest of continued employment. These properties were acquired by various agencies of the Government for production in the war effort, and are now, or shortly will be, declared surplus to Government needs. Listing of these plants by name of lessee is for identification purposes only, and has no connection with the lessee's own plants or facilities.

Information regarding these plants is available in the Washington office of the War Assets Administration and inquiries should be directed to the Industrial Division of Real Property. All data contained herein are necessarily abbreviated and subject to correction. They are not intended for use as a basis for negotiations. WAR ASSETS ADMINISTRATION reserves the unqualified right to reject any or all proposals or offers received for the above properties.

ADDRESS YOUR INQUIRIES TO:

WAR ASSETS ADMINISTRATION

INDUSTRIAL DIVISION OF REAL PROPERTY **WASHINGTON 25, D. C.**

491-T

☆ Canada

Seven Firms Start Four-Well South Alberta Plains Venture

Seven concerns with interests in the Princess area of the South Alberta Plains have joined forces for a 4-well oil and gas exploration program spread over 4 townships. They will operate through South Princess Syndicate, owning 5040 acres checkerboarded over Twp. 19 Rges. 11 and 12w4 and Twps. 17 and 18 Rge. 11w4 (townships in which the backing companies hold bulk of remaining rights).

Participants, and their percentage interest in the project, are Standard Oil Company of California, 46 percent; Pacific Petroleums Ltd., 17 percent; Princess Petroleums Ltd, 10 percent; Globe Oil Company, 9 percent; Empire Petroleums Ltd., 8 percent; Homestead Oil & Gas and Pacalta Oils Company, each 5 percent. California-Standard will manage the project, with locations staked on the basis of seismic and geological work by that company. Three wells will test the Sunburst-Madison sections (total depths around 3500 feet), while the fourth will go to the Devonian (total depth around 4500 feet).

Initial well, South Princess Syndicate 1, is being drilled immediately in SE 10 acres of lsd 9 28-19-12w4. It is a Sunburst-Madison test.

Gulf Research and Development Company has taken out a crown reservation covering 77,404 acres of oil and gas rights in the Pincher Creek area, South Alberta Foothills. South boundary of the block is around 12 miles north of the Montana boundary. Rights are in Twps. 3 to 5 Rge. 28w4, Twps. 3 to 6 Rge. 29w4, Twps. 4 to 6 Rge. 30w4, and Twps. 5 and 6 Rge. 1w5. A Gulf seismograph party is now working on the block.

Imperial Oil Ltd. has started the first wildcat on a ½ million-acre block of oil and gas rights acquired last August on the East Central Alberta Plains. The well, Imperial-Provost 1, is in lsd 3 27-37-3w4, in hitherto untouched territory about 35 miles southeast of the Wainwright field, and 65 miles southeast of the big Viking-Kinsella gas reserve, where Imperial has 2 rigs engaged in exploratory gas drilling. The Provost venture will be carried through the Cretaceous and Devonian, for a deep test of oil and gas possibilities.

Rotary equipment has been installed at Westflank 2, depleted Turner Valley well shot with a world's record (5200 quart) nitro-glycerine charge February 4, and the crew has succeeded in getting by the casing split at 5700 feet. Tools are now on top of the bridge at 6510 feet, and cleaning out of hole and determination of results of the blast are expected to be completed in the near future. The casing split had prevented cleaning out with cable tools. The operation is backed by Oil Well Reflow Ltd., and a number of Turner Valley producing companies.

Sun Veterans Honored

A "welcome home" party for returned veterans of the Sun Oil Company was held in Tulsa recently, honoring Floyd L. Swabb, Donald H. Waid, Russell R. Burris and Glen D. Hughes.

EXPLORATORY COMPLETIONS

ARKANSAS WILDCATS

Lonoke County—Failure: G. D. Howell, Tr.'s G. Barnwell 1, 18-3n-9w, abnd 1765.

Nevada County — Oil Discovery: Chas. F. Steele et al's H. L. Waters 1, n½ nw ne 20-14s-21w, 2½ mi sw Irma fld, perf 60 shots 1207-19, pump 30 bbls, td 2263.

CALIFORNIA WILDCATS

Kern County—Failures: Bender Oil Operations' Claire 1, 33-28s-28e, Kern River area, Olcese 853 ft, Pyramid Hills 2725 ft, Vedder 2767 ft, abnd 2789.

L. S. Gilmour & Associates' Tejon 1, 36-32s-29e, Tejon area, Granite 2376 ft, abnd 2445.

Terry Oil Co.'s K.C.L. 1, 18-29s-21e, Oildale area, abnd 2507.

Tehama County — Failure: Northern O&G Co.'s Tiger 1, 1-23n-7w, Paskenta area, abnd 2569.

Los Angeles County — Failure: Standard's Bohnke Community 1, 14-3s-11w, Leffingwell area, abnd 10,273.

COLORADO WILDCAT

Pueblo County—Failure: Continental's State 1-C, ne ne ne 4-18s-67w, Sullivan Park area, abnd 1938.

GEORGIA WILDCAT

Montgomery County — Failure: James E. Weatherford's H. Wilkes 1, ½ m w Higgeston, abnd 3433.

ILLINOIS WILDCATS

Bond County — Failure: C. C. Hutchins' Dieckman 1, ne nw ne 26-4n-2w, abnd 1362.

Coles County—Failures: Schoenfeldt-Hunter & Kitchens' Otto Meyer 1, nw nw sw 35-13n-8e, abnd 2249.

Nation Oil Co.'s R. H. Snider 1, nw nw ne 26-14n-10e, abnd 1045.

Jim Early et al's Katherine Carroll 1, se nw ne 36-14n-10e, abnd 980.

Edwards County—Failure: R. E. Johnston's E. Liddle 1, se se nw 19-1n-14w, abnd 3235.

Jefferson County — Failure: Essex Royalty Corp.'s Carpenter 1, nw ne se 3-1s-1e, abnd 2397.

Lawrence County — Failure: George S. Engle's Grounds 1, ne nw nw 22-2n-12w, abnd 1912.

Shelby County—Failure: Pana O&G Co.'s William Drain 1, se se se 16-10n-1e, abnd 1507.

Wayne County—Oil Discovery: Deep Rock's U. S. Spicer 1, sw sw ne 25-1n-5e, pump 12 bbls fr McCl. 3072-78, td 3086.

Wayne County—Failure: George S. Engle's B. H. Kinkade 1, sw nw ne 23-2n-9e, abnd 3223.

White County — Failure: Phillips' M. L. Brimble-Coomb 1, sw se sw 31-5s-10e, abnd 3227.

INDIANA WILDCATS

Fayette County—Gas Discovery: J. Snider et al's Asher Sizemore 1, 15-13n-11e, 20,000 gas fr Trenton 1074-84, td 1084.

Posey County—Discovery: Fox & Fox's Milton Andry 1, 10-4s-14w, pump 150 bbls fr T. S. at 2226-54, td 2980.

KANSAS WILDCATS

Ellis County — Failure: Phil-Han et al's Hambur 1, nw nw ne 4-12s-20w, abnd 3887.

Ford County — Failure: E. M. Swearer's Brown 1, sw sw sw 4-26s-23w, abnd 2915.

Pawnee County — Failure: Campbell & Kuhn's Keeley 1, ne ne nw 9-21s-15w, abnd 3781.

Rice County—Failure: Sharon Drlg. et al's Leatherman 1, ne se se 35-21s-9w, abnd 3788.

Rush County—Failure: Darby & Bothwell et al's Ficken 1, ne ne se 33-17s-17w, abnd 3596.

Stafford County—Failure: W. P. Faulkner's Fisher 1, c e½ nw ne 8-21s-13w, abnd 3625.

NORTH LOUISIANA WILDCATS

Caddo Parish—Oil Discovery: Union Prod. Co.'s Noel Est. 1-A, 11-19n-16w, Pettit 5437, Travis Peak 5700, Cotton Valley 7710, perf. 5520-30, 5000 gals acid, flow 14.5 bbls fluid, 8.25 bbls 39.5-gr oil, 6.25 bbls sw on Hughes lift, input gas 68,497 cu ft, input gas-oil ratio 8303/1, td 9225, pb 8119.

Richland Parish—Failures: Roy L. Fisher's Virginia Koerner 1, 36-16n-5e, abnd 4502.

A. W. Cherry-Barron Kidd's J. J. Achibald Est. 1, ne nw 29-16n-7e, Massive 3333, abnd 3420.

SOUTH LOUISIANA WILDCAT

Lafourche Parish—Failure: Gulf's Delta Securities Co. 14, 2063.3 e alg sl sect 1 fr swc sect 1 th 2052.5 n at ra in 1-19s-20e, Bully Camp area, salt 7883, abnd 7897.

MICHIGAN WILDCATS

Allegan County—Failure: J. W. Lang Co.'s Gerrit 1, se se sw 5-4n-15w, abnd 1518.

Bay County—Failure: Shell's Boeing 1, ne ne nw 26-18n-3e, Dundee lime 2859, abnd 3310.

Isabella County—Failure: Gordon Oil Co.'s Foley 1, se sw nw 29-15n-4w, Dundee lime 3780, abnd 3810.

Muskegon County—Failure: E. J. Bousma's Devine 1, ne nw sw 9-12n-15w, abnd 2020.

Oscoda County—Mio Field Oil Discovery: Ohio Oil Co.'s Mio Unit 1, se nw sw 30-25n-3e, pmp and flow 20 bbls, td 5120.

Tuscola County — Failure: Rowmor Corp.'s Skoropada 1, se sw nw 9-13n-10e, abnd 3168.

Van Buren County—Failure: E. W. Leeder's Crowell 1, ne nw sw 19-2s-14w, abnd 1095.

MISSISSIPPI WILDCAT

Clarke County—Failure: Sun's Long Bell Pet. Co. 1, nwc 7-2n-17e, Eutaw 3833 ft, Tuscaloosa 4256, Massive sd 5428, abnd 5739.

MONTANA WILDCAT

Petroleum County — Failure: Ike Taylor's Fraser 1, se se ne 15-13n-27e, Lepper anticline, completed as wtr well, td 2813.

NEW MEXICO WILDCATS

Lea County—Failures: Amerada's Hooper 1, c nw ne 27-19s-35e, elev 3733 ft, anhy 1740, salt 1870-3190, Yates 3390, abnd 3500.

Southern Union Gas Co.'s English 1-a, 1980 nsl 710 ewl 26-18s-33e, elev 3811, anhy 1502, salt 1805-2895, red sand 4266, abnd 5323.

OKLAHOMA WILDCATS

Lincoln County—Failure: Hubble & Webb's Bukaty 1, ne ne ne 19-15n-6e, abnd 3400.

Caddo County—Failure: Shaffer's Cooke 1, ne se se 35-5n-9w, abnd 9201.

Cotton County—Failure: Neeld & Hood Drlg. Co.'s Henderson 1, nw nw se 23-3s-11w, abnd 1495.

Creek County—Failure: C. E. Beal's Briggs 1, nw sw sw 27-19n-8e, abnd 3348.

Grady County—Failure: J. R. Porter's Willa Mae 1, nw nw ne 28-3n-7w, abnd 4243.

Pittsburg County — Failure: Public Service Co.'s Jones 1, s nw se 36-8n-13e, abnd 2280.

Stephens County—Oil Discovery: Skelly et al's Williams 1, se sw ne 16-1s-4w, pump 103 bbls oil in 20 hrs, fr Penn. sd, 5414-68, td 7158.

Stephens County—Failures: Lundy & Shears' Wild 1, ne ne se 29-1s-5w, abnd 3532.

Champlin Ref.'s Henry 2, ne ne sw 13-2n-5w, abnd 900.

WEST TEXAS WILDCAT COMPLETIONS

Dawson County—Failure: Ray A. Albaugh et al's Middleton-Cities Service 1, c ne ne E. L. & RR. 69, blk 8, elev 3036 ft, anhy 1990, salt 2020, Yates 2520, San Andres 3980, abnd 5014.

Irion County—Failure: John I. Moore et al's Murphey 1, c nw nw GC&SF Ry. 1227, elev 2566, base black shale 7970, Ellenburger 7985, abnd 8398.

WEST TEXAS NEW PAY TEST

Andrews County—Fullerton-Devonian Upper Discovery: Superior-Fuhrman Pet. Corp.'s Eva Coopwood 1, c ne ne PSL 4, blk A-47, 1 mi s of semidepleted Devonian disc for fld, elev 3270, anhy 1750, Yates 2940, brown lime 4050, Grayburg 4255, San Andres 4500, Clear Fork 6090, Fullerton 6855, flow 691 bbls 42.1-gr, gor 1272/1, natural via 32/64-in, fr Clear Fork open hole 6885-7003.

WEST CENTRAL TEXAS WILDCATS

Jones County—Failure: G. C. & J. V. Howell's Gillespie 1, se se sw sect 45, Orphan Asylum Lands, elev 1731, Gunsight 2365, Swastika 2468, abnd 2500.

Shackelford County—Failure: Carl Hovgard et al's Gustafson 1, se se nw BBB&C Ry. sect 169, elev 1516, abnd 3335.

NORTH TEXAS WILDCATS

Archer County—Failures: Clyde Gibson Dr. Co.'s Wilson-McCrory 1, 330 ft out sec lot 1, sect 67, ATNCL, KMA 3980, abnd 4421.

H. R. Theck et al's Seale 1, 150 out sec 83-ac lse and blk 144, J. W. Harris sbdn, abnd 1482.

Baylor County—Failure: C. G. Hart et al's Howe 2, 150 s 150 w of nwc sect 1, A-1009, but in sect 20, Daniel S. Ward sur A-560, elev 1222, abnd 301.

Cooke County—Failure: Anderson Dr. Co.-Akin-Dimock's Ramsey-Texaco 1, 1320 snl 330 ewl B. Lusk sur A-569, elev 852, Elenburger 2098, abnd 2235.

Foard County—Failure: DeKalb Agricultural Assn's Kincaid 1, 3000 snl 330 ewl of Isaac Aldridge sur, elev 1462, Canyon 3730, Missis-

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50— 500 Barrels
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Heavy A.P.I. New closed bolted type steel tanks now located at Ogden, Utah. Can quote reasonable prices in order to move from present premises at once.

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National Stock Yards, St. Clair County, Ill.

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1—Delco Light Plant, 110 Watt, 4 Cylinder ..... $ 300.00
1—Set Bovard Elevators 5-6-8-inch Slips $1000.00
1—Cable Turn Buckle Rig which includes 4-inch relegs. 1—6000 Marion Sand Reel with Timken Bearings..$1000.00
Steel Bull Wheel and Calf Wheel, Band Wheel and Crown Blocks in good shape..... $1000.00
1—O.C.S. 96-foot combination Rotary Derrick, 33,300 capacity, complete..$ 700.00
2—5-inch Stems, 30 foot long, 4 x 5 box ..... $ 250.00
2—¾-Inch Stems, 2¾ x 3¾ box..... $ 250.00
1—Set of Four Sheave Casing Blacks, good shape..... $ 250.00

Prices F.O.B. Falls City, Nebraska
Call or write to C. M. Turner, Falls City, Nebraska, or to C. E. Wells, Columbus, Nebraska.

■ FOR SALE: Complete Rotary Drilling Rig less Derrick. Now operating near Three Rivers, drilling 2 to 3 thousand feet with 4½" Drill Pipe. Price including 1000' 4½" Drill Pipe $6,000.00. Clark Drilling Co., Phone 158, Three Rivers, Texas.

FOR SALE

Equipment from two natural Gasoline Plants

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Box 220 — Ranger, Texas

■ **FOR SALE: At Aransas Pass, Texas; Three 180 RPM Clark Two Cycle Gas Compressors 16" x 20" Power Cylinders and 7¼" x 20" Compressor Cylinders, One 5½" x 20" Compressor Cylinder Type VS, One 13" x 20" Type "S" Double Acting Compressor Cylinder. Condition Very Good. Price $5000.00. Bryant & Saner, Box 107, Kerrville, Texas.**

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220' of 6⅝" O.D. X Heavy 28.57# Seamless Plain end.
3,000' of 2" (2⅜" O.D.) XX Heavy 9.02# Seamless T & C.
5,000' of 2½" (2⅞" O.D.) XX Heavy 13.70# Seamless T & C.
1,500' of 3" (3½" O.D.) XX Heavy 18.56# Seam. P & C.
1,300' of 3½" (4" O.D.) XX Heavy 22.85# Seam. T & C.

All of Above pipe on our racks at Ceiling prices subject to Prior Sale. Wire or Phone. SEMINOLE PIPE & SUPPLY CO., Ph. 5951, Corpus Christi, Texas.

FOR SALE

■ FOR SALE: 1—Used 12 trace Heiland Research Corporation Seismograph Instrument unit, mounted on '39 Ford dual truck available for immediate delivery. Cities Service Oil Company, Patridge, Bartlesville, Oklahoma.

■ NEW 300 H.P. COMPRESSOR—Immediate shipment, one Clark 300 H.P. Model RA super 2-cycle right angle gas engine driven compressor equipped with two 15" compressor cylinders 14 x 14 with complete equipment. Brand new, never used. R. H. Armstrong, Box 1191, Texas City. Telephone 1190.

HELP WANTED

■ CORE DRILLER—Experienced core and water well driller to handle new Failing 1500 rotary rig in Rocky Mountain States. Attractive salary and bonus to the right man. Write giving full details on experience, past employment and personal data. Mountain States Exploration Drilling Company, 136 East Twentieth Avenue, Denver, Colorado.

Wanted: ENGINEER GRADUATE, under 37 years of age, with pipe line experience, for position in major pipe line company's dispatchers' office. Good chance for advancement. Address: 1302 Hunt Building, Tulsa, Oklahoma.

LEASES, DRILLING, ACREAGE, ETC.

■ Experienced geologist has five surface structures subsurfaced four pay horizons two thousand to six thousand feet. H. P. Willis, Phone Logan 6-3151, 4638 Waneta Drive, Dallas, Texas.

■ WANTED to lease 160 acres in the Lake Saint John Field in Tensas Parish, La., for immediate drilling—Liberal terms if can drill now. M. J. Zollman, Bedford, Indiana.

■ Have approximately 300 stripper oil wells in the Bartlesville, Oklahoma, District. Mostly on Fee Lands. Present production very small. Prospects very good for secondary recovery. Plenty of gas and/or water for repressuring purposes. Desire responsible concern to take over on small over-ride basis, who will develop properties and employ best modern engineering methods toward such secondary recovery. Or might consider employing competent Engineer to take complete charge to develop these properties. Address c/o The Oil Weekly, Box 27, Houston, Texas.

SITUATION WANTED

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Returning north on account of climate. Desires to remain associated with the petroleum industry in capacity of oil company advertising manager in promoting industrial or consumer sales of gasoline-lube-diesel products.

Herbert Haworth,
P. O. Box 2608,
Houston, Texas.

sippi 5562, Ellenburger 5932, abnd 5953.

Wichita County—Failure: Scott Bros. et al's Jackson 1, 450 out nwc labor 16, lge 4, Denton CSL, abnd 1257.

EAST TEXAS WILDCATS

Cherokee County — Failure: Clark-Cowden Dr. Corp. et al's Southern Pine Lbr. Co. 1, 1134 ewl 2645 nsl Nicholas Newton sur, Pecan chalk 4055, abnd 5190.

Navarro County—Failure: Jas. E. Smith-R. J. Banks' S. S. Skinner 1, 330 snl 5775 ewl of Peter Jackson sur, 5 mi se Purdon, elev 455, base Austin chalk 1938, Woodbine 2230, abnd 2504.

Wood County—Failure: W. F. Bridewell-Bobby Manziel's Coker 1, 400 ewl 450 nsl of 80-ac tr and Wm. Clark sur, ½ mi n of Crow, elev 462, Navarro 2340, Nacatoch 2402, Pecan 3328-3660, Austin 4860-5016, Sub-Clarksville 5184, Woodbine 5507, Comanche 6250, George-

SITUATION WANTED

■ SALES ENGINEER with extensive contacts with oil companies and industrial concerns desires manufacturer sales representative connection for Texas Gulf Coast area. Thirteen years sales experience in this field. Age 36. Graduate engineer. Home in Houston. Have car. Ample references including present employer. Address Box 26, c/o The Oil Weekly, Houston, Texas.

■ SITUATION WANTED: Land man, production or Drilling superintendent, 16 years experience would like connection where would have interest operations. Address: Box 25, c/o The Oil Weekly, Houston, Texas.

NOTICES

GEOLOGICAL MAPS

Covering the Gulf Coast of Texas and Louisiana, showing all new discoveries and all dry holes drilled to April 15, 1946. Dry holes show well-elevations, total depths, and paleontological data. Oil fields colored green, gas fields red, sulphur purple, geophysical prospects yellow, depleted fields brown. Gulf Coast of Texas in one section size 4½ ft. by 10½ ft. Scale one inch to two miles. Price on paper $50.00, on linen $75.00. Louisiana Gulf Coast covers from T3N to the Gulf drafted in two sections, scale one inch to two miles. Hand colored the same as the Texas Gulf Coast. Size of each section 3½ ft. by 10 ft. Price of each section $25.00 on paper and $37.50 on linen.

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Trading Post Section, The Oil Weekly
P. O. Box 2608 Houston 1, Texas

town 6305, Ft. Worth 7010, Goodland 7500, Paluxy 7580, abnd 7752.

SOUTH CENTRAL TEXAS WILDCAT

Gonzales County—Failure: Amerada's Henderson et al 1, 601.6 fr nl 600 fr sl 625.8 fr wl 40-ac tr, Jas. Gibson sur, chalk 8308, Edward lime 8770, abnd 10,902.

SOUTHWEST TEXAS WILDCATS

Duval County—Failures: Frank J. Gravis' H. Becher 1, 1408 e 831 s fr nwc BS&F sur 531, 330 fr n&el 172.8-ac lse, abnd 4515.

Chas. H. Houston-W. T. Farrier's Mucio Ruiz 1, 330 ff ely/nel 346-ac lse, 380 se fr s cor P. Garcia sur 2, in sur 44, abnd 1300.

Webb County—Failure: Blanco Oil Co.-Al Buchanan's Marrs McLean 2, 970 fr sl 4850 fr el Edginton sbdn Albercas Gr, 650 w 100 s of McLean 1 dry hole, on 1020-ac lse, abnd 2615.

LOWER TEXAS COAST WILDCATS

Bee County — Failures: Houston Oil Co.-Humble's Mrs. M. M. McKinney 1, 1980 fr nel 7260 fr sel L. C. Randolph sur, 2705.3-ac lse, 4110 se McKinney 3, nearest well at Pettus fld, abnd 8686.

Tom Slick's Rosie E. Borroum et al 1, 660 fr wl 375 fr sl Geo. J. Brown sur, 660 fr s&wl 579-57-ac lse, in swc 650.864-ac lse, 1 mi e Plumme-Wilcox fld, Pettus 3150, abnd in Wilcox 6940.

Jackson County — Failure: Martin Thompson's Mrs. E. H. Duenow 1, 660 fr el 330 fr sl Magnolia's 700-ac lse, on 40-ac Framout, 330 fr sl 9500 fr el G. Ewing sur, abnd 6529.

Karnes County—Failure: Jay Simmons' J. R. C. McDougal et ux 1, 844 w of swc W. L. Taylor sur, 3300 s of nl Leckie sur, abnd 7215.

San Patricio County—Failure: Southern Minerals Corp.'s Katherine Clifton 2, 4000 fr nwl 4500 fr nel 9412-ac lse, Jas. B. Wilson sur, 1 mi s Tynan, abnd 5305.

UPPER TEXAS COAST NEW PAY TESTS

Austin County — Raccoon Bend Failure: Humble's Luther R. Sherrod 16-Y, 1407 fr swl 646.5 fr nel 200-ac lse, W. C. White sur, flow gas 11,018 and 11,108, tool trouble, abnd 11,447.

Chambers County—Red Fish Reef Distillate Discovery: Humble's State-Galveston Bay 35-A, 660 fr se&swl sect 225, 4303 se well 2-A, 640-ac lse, pay 11,242, perf 63 shots 11,038-48, 11,066-67 flow 75.6 bbls 51.4-gr, 1,446,000 gas, ¾-in, gor 19,136/1, tp 3600 lbs, td 11,242.

Wharton County—El Campo Distillate Discovery and NE Extension: Searboard of Dela.'s Gertrude Peterson 1, 467 fr s&el sect 49 and 160-ac lse, 2 mi ne prod, ETRR sur, new pay 6921, perf 32 shots 6961-65, flow 14 bbls 50-gr cond, 36 mln gas, ¾-in, tp 2590 lbs, td 7595.

WYOMING WILDCAT

Albany County — Oil Discovery: Wasatch Ref. Co.'s Coughlin 2, ne 26-16n-77w, Rex Lake area, pump 15 bbls in Dakota, td 3969.

WESTERN CANADA WILDCATS

Alberta Syncline—Crossfield Failure: Imperial Oil-Anglo Canadian Oil's Crossfield 1, lsd 9 11-28-2w-5th, abnd 9526 in Devonian Dolomite.

South Alberta Plains—Lethbridge Failure: Imperial Oil's Lethbridge 2, lsd 15 35-7-22w4th, abnd 6426 in Devonian Dolomite.

Saskatchewan — Vera-Unity Failure: Bata Petroleums' No. 13, lsd 10 3-39-22w-3rd, abnd 2174 in Devonian limestone.

No Marine Fossils Drilled in Abandoned Washington Test

Standard Oil Company of California has released additional data on its recently abandoned wildcat, Ferndale Community 11-61-5, in Whatcom County, Washington.

Glacial drift was penetrated in the first few hundred feet. Subsequently, all the drilling was through the non-marine Chuckanut formation of sandstone and shales. Cores at various depths showed a certain amount of plant life and Carbonaceous material, but no marine fossils. The Chuckanut formation persisted to bottom as "quite tight," with no showings of gas or oil. Some thin seams of coal were encountered, geologists reported.

Standard, in explaining why the drilling was undertaken, said that the showings of gas in shallow wells near Bellingham and the results of geophysical surveys "led us to seek better sands at much greater depths."

The well was in Pleasant Valley, four miles northwest of the community of Ferndale.

WILDCAT STARTS

ARKANSAS

Calhoun County: E. C. Johnston's Freeman-Smith 1, ne nw 27-14s-15w, lcn.

Nevada County: Placid et al's Mrs. Levi West et al 1, c nw se ne 19-14s-21w, lcn.

CALIFORNIA

Kern County: Miller and York's K.C.L. 3, Round Mountain area, 13-28s-28e, ru.

Richfield Oil Corp.'s M. & L. Fee 3, 18-29s-21e, Temblor area, ru.

Standard's K.C.L. 24-32, 30-11n-24w, San Emidio area, drlg.

Humboldt County: Texas Co.'s Holmes-Eureka 3, 23-3n-1w, Eureka area, grading.

Tulare County: Union Oil Co.'s Griffen 45-8, 8-22s-26e, Tipton area, foundation.

Los Angeles County: General Pet. Corp.'s La Mirada Community 46-1, 16-3s-11w, La Mirada area, lcn.

Orange County: Hiawatha Exploration Co.'s Atha 3, 13-6s-11w, Huntington Beach area, foundation.

Ventura County: Superior Oil Co.-British-American's Black 3, 13-4n-18w, Del Valle area, grade.

Texas Co.'s Kern 13-NE-18, 18-4n-17w, Del Valle area, cellar.

D. D. Feldman's N. Richardson 1, 14-3n-21w, South Mt area, grade.

Santa Barbara County: Union Oil Co.'s Sisquoc 6, 25-9n-32w, Sisquoc area, lcn.

ILLINOIS

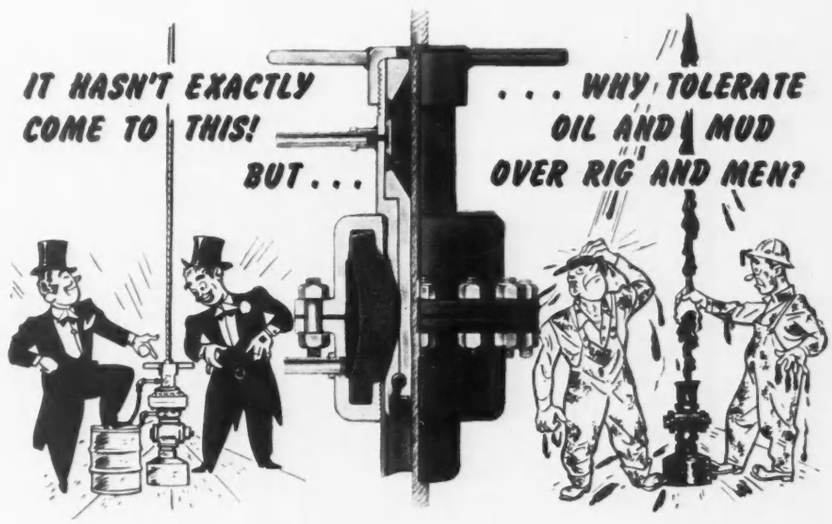
Clinton County: Collins Brothers' W. Sachtleben 1, nw nw se 33-1n-2w, lcn.

Hamilton County: Magnolia's W. I. Rohrer 1, nw ne sw 23-4s-7e, lcn.

Tex Harvey's A. T. 1, ne se sw 23-5s-7e, lcn.

White County: W. O. Allen's Hanna Brothers 1, nw ne se 28-5s-10e, drlg.

REGAN'S NEW WIRE LINE STRIPPER



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INDIANA

Gibson County: George Engle's John Hillyard 1, sw sw sw 27-2s-10w, lcn.

LaPorte County: Walter Blow's R. T. Martin 1, sw sw se 8-38n-3w, lcn.

KANSAS

Barton County: John LeBosquet & Biddle's Isern 1, ne ne nw, 19-19s-11w, mim.

Texas Co.'s A. L. Fish 1, sw sw sw 16-19s-12w, rur.

Rush County: Sohio Oil & Rine Drlg. Co.'s Mendenhall 1, se se se 3-18s-19w, rur.

M. A. Isern's Dwyer 1, sw sw se 1,-19s-18w, lcn.

WESTERN KENTUCKY

Adair County: H. L. Cokes' G. Mitchell Heirs 1, 8-G-47, drlg.

Union County: Sun's Willett-Byrnes 1, 2-0-21, lcn.

NORTH LOUISIANA

Caldwell Parish: Atlantic's La. Central Lbr. Co. 1-E, 32-13n-4e, dr 1710.

Sabine Parish: E. W. Delbridge, Jr.'s Leach et al 1, 11-6n-12w, lcn.

R. B. Dewitt's Sabine Lbr. Co. 1, 31-7n-13w, ru 2600-ft test.

Tensas Parish: Chicago Mill & Lbr. Co.'s Mutual 2-A, 30-12n-10e, Massive sd test.

SOUTH LOUISIANA

Beauregard Parish: Barnsdall's Edgewood Ld. & Lg. Co. 1, 1004 w 992.7 m of sect 11-6s-10w, 2½ mi n Gordon fld, 4 mi w Bear fld, 12,000-ft test.

Cameron Parish: Sohio's Chas. Richard 1, c sw¼ sect 1 of 1-15s-5w, 9 mi w sw Pecan Lke 8 mi se Little Chernier gas fld, 11,000-ft test.

Evangeline Parish: Magnolia's L. Morein 1, c nw¼ sw¼ 3-5s-1e, 2 mi e of Mamou disc well, 12,000-ft test.

MICHIGAN

Allegan County: Superior Oil Co.'s Shafter 1, sw se se 35-1n-12w, dr.

Hillsdale County: H. C. Roger's Zeiter 1, se se ne 24-8s-4w, rig.

Missaukee County: Gordon Oil Co.'s State A-1, ne ne se 31-23n-8w, dr.

Montcalm County: West Michigan Consumers Co.'s Baty 1, nw se se 17-11n-9w, rig.

Saginaw County: Bridgeport Oil Co.'s Van Sickle 1, se se sw 33-10n-3e, dr.

Wexford County: George C. Hanner's Lang 1, sw se nw 11-22n-10w, dr.

MISSISSIPPI

Lincoln County: Humble's Lincoln Cty. Bd. Supervisors 1, ne ne 16-8n-5e, lcn.

California's F. W. Parnell 1, ne se 17-6n-8e, lcn.

MONTANA

Toole County: Union's Danielson 1, c ne nw 8-34n-2e, Grandview structure, ru.

OKLAHOMA

Cotton County: Neeld & Hood Drlg. Co.'s Henderson 1, nw nw se 23-3s-11w, drlg.

Johnson-Fisher Drlg. Co. et al's McCullough 1, nw se nw 17-4s-13w, rur.

Garvin County: British American's Guthrie 1, nw nw se 7-3n-2w, dk & tools.

Pontotoc County: Rocket Oil's McClure 1, sw se nw 10-4n-5e, drlg.

Garvin County: Mid-Continent's Menefee 1, se se se 2-4n-2w, lcn.

Mid-Continent's Davenport 1, ne ne nw 28-4n-2w, rur.

McClain County: Rogers & Rogers' Ainsworth 1, ne nw se 26-5n-4w, mit.

Big Chief Drlg. Co.'s Stephens 1, c se sw 24-5n-2w, lcn.

Carter Oil Co.'s Hastings 1, c se nw 29-7n-3w, bldg roads.

Pottawatomie County: F. C. Hall-J. E. Wise-Gulf's Marie J. Clearman 1, se sw se 32-11n-5e, mirt.

Atlantic's Kennedy 1, sw se ne 22-9n-8e, mirt.

James S. Wise et al's Meneilly 1, ne nw se 8-10n-5e, c&p.

Stephens County: Amerada's Paschall 2, nw se se 29-1s-5w, rur.

Champlin Ref.'s Henry 2, ne ne sw 13-2s-5w, ur. 725 ft.

Champlin Ref.'s Williford 1, se nw nw 13-2s-5w, pits.

Rocket Oil Co.'s Paschall 1, ne nw se 32-1s-5w, drlg 220 ft.

Celine Oil's Cooper 1, se nw se 1-2n-8w, mit.

WEST TEXAS

Crockett County: Moore Exploration Co.'s Maggia S. Neal 1, 2198 nsl 467 wel sect 2, D. L. Carver sur, 3000-ft Clear Fork cable tool test.

Mitchell County: Willbanks Bros. et al's Percy Jones 1, nw se se T&P Ry. 13, blk 30, T-1-S, 1 1/16 mi sw of nearest Iatan-East Howard prod, 3500-ft cable test.

Pecos County: R. B. Rawlins et al's H. Cordz 1, 330 out sect H&GN Ry. 101, blk 8, 2000-ft cable test.

WEST CENTRAL TEXAS

Coleman County: H. O. Newman-B. H. Nolan's John R. Pearce 1, 990 snl 330 wel Lbr 9, lge 57, Coleman CSL sur, 2500-ft cable test.

Fisher County: Skelly's D. O. Huddleston 1, 1675 ewl 2816 snl T&P Ry. 11, blk 19, 5500-ft Strawn test.

Jones County: Homer W. Snowden et al's G. W. Poe 1, 467 out swc Lbr 1, lge 358, Goliad CSL sur, 1 1/16 mi e outpost for Neianda pool, lcn.

Shackelford County: Max Eversberg Jr. et al's W. P. Newell 1, 440 out sect nw T&P Ry. 12, blk 12, 1200-ft cable test.

Taylor County: West Central Dr. Co. et al's T. J. Hinds 1, 330 wel 3000 nsl sbdn 2, Jose Gabo sur 128, 3500-ft rotary test.

NORTH TEXAS

Archer County: Benson Bros. et al's Mrs. J. H. Turbeville 1, 350 ewl 1400 nsl blk 149, Robert Carson sbdn, 1700-ft rotary test.

Cochran & Cain's V. Seay 2, 150 out nwc blk 69, J. W. Harris sbdn, 1400-ft rotary test.

L. M. Price et al's Mrs. Mary Pechacek 1, 3350 snl 1500 wel M. Fanning sur A-128, 600-ft cable test.

F. P. Timberlake-H. M. Kelleher's D. L. Wolf 1, 150 snl 450 wel of W. Polk sur A-717, 1600-ft rotary test.

D. L. Wolf et al's G. E. Campbell 1, 450 wel 2850 nsl blk 87, J. W. Harris sur, 1400-ft rotary test.

Cooke County: Texas Co.'s 1st Nat'l Bank (St. Jo) 1, 1589 m/e/e/978 nsl T. J. & J. Ellerd sur A-1482, 2300-ft test, dr 650 ft.

Grayson County: Standard of Tex.'s Clyde E. Moore 1, 467 out nec H. Brown sur, 4620 nw of its Ellenburger pros, 6500-ft Strawn test.

Wichita County: Geo. W. Cooper et al's J. L. Jackson 1, 330 out nec w½ lbr 25, lge 4, Denton CSL sur, 5200-ft Ellenburger test.

Ted Norwood et al's Ed. Payton 1, 750 snl 150 wel blk 319, Waggoner Colony Lands, 2200-ft rotary test.

EAST TEXAS

Gregg County: B. F. Phillips et al's C. C. Crews 1, 1000 wel 330 nsl of 122-ac tr, or 330 nsl 2750 ewl of Leonard Perkins sur, Woodbine test, dr 2200.

Wood County: Humble's Paul McKnight-Lewis Rosen 1, 660 out swc of 320-ac tr and W. R. James sur A-335, ½ mi n of ne edge of Hawkins fld, 12,000-foot Smackover lime test.

SOUTH CENTRAL TEXAS

Atascosa County: H. R. Smith-Skinner & Eddy Corp.'s Hurt & Tartt 1, 467 fr sel 1400 fr nel Jas. Wilkinson sur 144 on 160-ac lse, 6500-ft Wilcox test.

Bexar County: J. F. Hair's Fee 1, 1000 fr nel 501 fr nwl 200-ac lse, Domingo Losoya sur 2, 800-ft test.

Geo. Parker-Chas. L. McCune's F. Cunningham 1, 500 n fr w cor 27.5-ac tr th 330 e at ra to lcn in J. M. Urriegas sur, 500-ft test.

Frio County: Geo. W. Strake-Warren Pet. Co.'s Grace C. Henry 1, 467 w of el 3700 s se of n cor 3547-9-ac tr, A. Petra de la Pena 153, 4500-ft test.

Guadalupe County: United N&S Dev. Co.'s J. F. Webb 1, 1270 fr nely/nel 330 fr sely/nwl of 151.8-ac lse, Jas. Hodges sur, 2600-ft Serpentine test.

Medina County: Woodrow Glasscock's Garle Mercantile Co. 1, 330 fr sl John Twohig sur 1111 330 fr wl 1334.2-ac lse, 3500-ft test.

SOUTHWEST TEXAS

Duval County: Forest Oil Corp.'s Peter McBride 1-A, 330 fr el 1650 fr nl lot 2, blk 24, 5600-ft test.

Southern Minerals Corp.'s Juan Benavides 2, 3536 fr nwl 3424 fr swl 1594-ac lse, sbdn 1, El Mesquite Gr, 3400-ft test.

Jim Hogg County: Humble's Mestena O&G Co. 5-B, 467 fr el 210 fr sl sect 4 Fowler & Rankin sbdn, Patlitos Blancos Gr, Weil fld area, 5500-ft test.

Buffalo Oil Co.'s Ysidro Vela 1, 330 fr sl 3336½ fr nl blk 141, W. A. Dannelly sbdn of Ysidro Vela ld of 1855.5-ac in sur 575, El Peyote Gr, 2000-ft test.

Starr County: Coastal Ref.'s Chas. Rogan Est. 1, 1980 fr swl 1980 fr sel blk 6, El Javali Gr, 462-ac lse, 2500-ft test.

W. H. Holland's Roos Bennett 1, 330 fr n&el 120-ac lse, 1830 fr el 2609 fr nl sh 100 porc 93, se Boyle fld, 3400-ft test.

Continental's Mrs. Bess S. Semmes 1, 330 fr el 1650 fr sl sur 906 on 640-ac lse, w of Rincon prod, 1½ mi n ne Frio prod sw Rincon, 4700-ft test.

Webb County: H. B. Zachary Co.'s Valera Vela Cuellar 1, 1650 fr nel 1650 fr nwl sh 4, Cuellar Gr, 580-ac lse, 2500-ft test.

LOWER TEXAS COAST

Travis County: L. M. White's W. R. Nabours 1, 330 fr s&el 80-ac lse, G. Gates sur, 8000-ft test.

Live Oak County: Dirks Bros.-Slick Oil Co.'s Mrs. J. L. Rentfro 1, 467 fr sel 1442 fr nel 449-ac lse, 1300 fr nel 1200 fr nwl BS&F sur 2, mi 3600-ft test.

Bee County: Monday Oil Co.-Delange & Rowe's Valentine Kubala 1, 330 fr ne&sel 363.5-ac lse, Bee CSL sur 12, 1½ mi sw Yoageen oil prod, ½ mi w of Davis 1 gas well, set surf csg for 3900-ft test.

Calhoun County: J. C. Wynne's S. H. Wilborn 1, 433 n 289½ w fr sect 164.8-ac tr, Manuel Lopez Gr, on 30-ac lse, 6500-ft test.

UPPER TEXAS COAST

Wharton County: Jos. Hornberger, Jr. et al's Gilbert J. Hafernik 1, 330 fr n&wl 160-ac tr, BBB&C sur, sect 4, 4 mi s Lakeview fld, lcn.

WYOMING

Sweetwater County: Texas Co.'s U. P. 2, nw 31-19n-97w, Table Rock structure, dr 1300 ft.

WESTERN CANADA

South Alberta Plains—Princess: South Princess Syndicate's No. 1, se lsd 9 28-19-12w4th, ru.

Central Alberta Plains—Baxter Lake: Baxter Lake Oils' No. 1, sw lsd 12 20-46-5w4th, ru.

Provost: Imperial Oil's Provost 1, lsd 3 27-37-3w4th, dr.

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Safety Record Lauded

Approximately 155 members of the Cities Service Oil Company's oil production division were honored at El Dorado, Kansas, recently with a dinner, at which they were presented a certificate of award for having completed 100,000 man hours of work without a lost-time accident.

SQUEAKS from the BULL WHEEL

She Didn't Snore, Maybe

"I can let you have a cot in the ballroom," said the hotel clerk, "but there's a beautiful young lady in the opposite corner. However, if you don't make any noise, she'll be none the wiser."

The weary traveler said okay, wonderful, certainly he wouldn't make any noise, and off he went to bed. Ten minutes later he was back, white and trembling. "Say, that beautiful young lady in there is dead!"

"She sure is, bub, but how did you find out?"

Deceiving Woman

For years she had tried to make her husband mend his errant ways by scolding, nagging, and occasionally beaning him with a skillet. Then one day she decided to try kindness and sweetness, so when he reeled home late that night she greeted him with a highball and words of honey. Later, as he staggered off in search of a bed, she called out from her room. "Why, don't you sleep in here, darling?"

He halted, scratched his head, blinked owlishly, then nodded. "Might as well. M'wife's gonna give me the devil when I get home, anyway."

This Curious World

Before the housing shortage we demanded five rooms and a bath. Now we're satisfied with five rooms and a path.

She was only a coalman's daughter—but, oh, where she had bin!

The doctor told the Scotsman that his wife needed some salt air. Next time the medico called, he found the Scot fanning his wife with a pickled herring.

"Son, it's none of your business how I met your mother—but you'd better not learn to whistle!"

Women's styles have changed but their designs remain the same.

The reason Dan Cupid makes so many bum shots is that he aims at the heart while looking at the legs.

Poet's Nook

If Little Red Riding Hood lived today
The modern girl would scorn her—
She only had to meet ONE wolf,
Not one on every corner!

Encore

He rocked the boat
Did little Frank.
These bubbles mark
o
o
o
o
Where Frankie sank.

Natural Conclusion

"I thought you were dead."

"Why?"

"I heard three people speak well of you yesterday."

Won't Be Rude

"How's your wife?"

"I dunno. I haven't spoken to her since I stayed out all night a month ago."

"Why?"

"I don't want to interrupt her."

Versatility

Hitchhikers find more uses for thumbs
Than anyone supposes.
In fact, when they're refused a ride,
They use them on their noses.

Memories

A beautiful girl, emerging from the secluded pool where she had been enjoying a swim a la natural, heard a rustling in the bushes. "Who's there?"

"Willie."

"How old are you, Willie?"

"Eighty-nine, dern it!"

The Woman's Way

"Will you marry me?"

"No, but I'll always admire your taste."

Let Him Toot the Tuba

The village organized a band and ordered the instruments from a mail order house. Soon they arrived—the trombone and trumpet and cymbals and the big bass drum and the sax and clarinet. Everything but the giant tuba. With the order came the explanation that the giant tuba was such a big, heavy instrument, requiring such thick lips to fill the mouthpiece and such an enormous amount of wind to play it that there was little demand for it and the firm carried none in stock. The letter added that if the villagers were sure that they had someone capable of tooting the giant instrument, one would be coming forthwith.

The reply was prompt and pointed: "I am the man who will play the giant tuba. I am the village blacksmith. I am seven feet all and weigh 250 pounds, which should convince you I am man enough to handle the giant tuba. I have lips like a pair of Virginia hams, which should convince you that my face won't be lost in the mouthpiece. And as for the wind—well, pardner, I can stand five feet behind a horse and blow the bridle right out of his mouth!"

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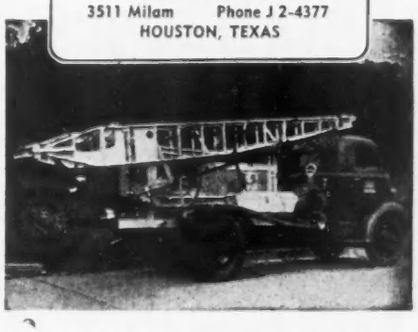
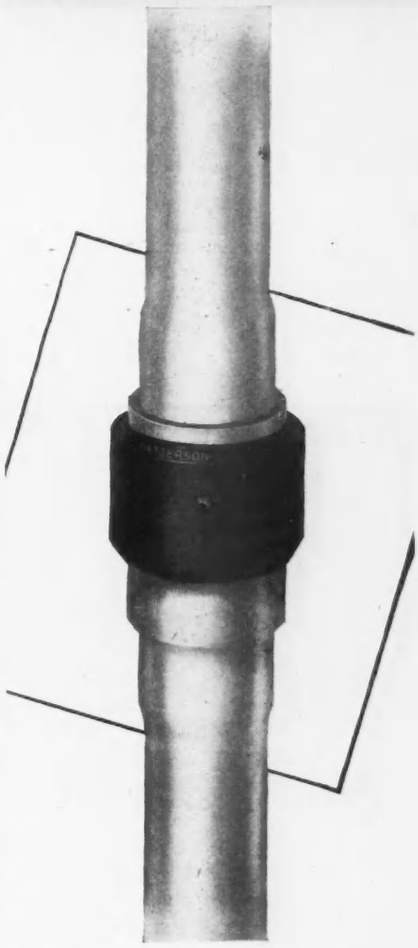


"Best Bet Yet"



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These oil-proof, insulating, wear-resistant, plastic tubing protectors are an integral part of the tubing collar. Made in all sizes, they prevent the metal-to-metal contact that causes many expensive "wet" jobs in pumping wells. Without this contact, the collars do not wear holes in the casing.

See Composite Catalog

Patterson-Ballagh TUBING PROTECTOR
LOS ANGELES HOUSTON 10 NEW YORK 6

MEN IN THE INDUSTRY NEWS

E. S. Calvert, manager of production, Devonian Oil Company, Tulsa, was named a vice president and director of the company. He succeeds the late **George D. Foster** as director.

»

George H. Bowen of the legal department, Sun Oil Company, addressed the Tulsa Association of Life Underwriters on "The Oklahoma Community Property Law."

Ralph C. Steinman, former chief scout for Sinclair Prairie Oil Company, has been transferred to Wichita Falls as pipe line scout and crude solicitor for the Sinclair Prairie Oil Marketing Company in North Texas.

»

Don Johnson, Evansville, Ind., has been placed in charge of the district office of Kingwood Oil Company at Evansville, following the removal of the general office of the firm to Jackson, Miss.

James P. Murphy is associate director of Shell Oil Company's newly formed division of exploration and production research, which will be the center of all research pertaining to problems of finding and recovery of oil. Laboratory quarters for the division are now being constructed at 3700 Bellaire Boulevard, Houston. Murphy joined Shell in 1937 at Los Angeles as an exploitation and production engineering trainee, and by 1940 was production engineer for the coastal division at Ventura. In 1941 he was returned to Los Angeles as senior production engineer for activities west of the Rockies.

James P. Murphy

»

J. H. Lawson has been appointed general manager of crude oil purchases for The Atlantic Refining Company. Lawson, who has been acting in that capacity for 15 months, will continue his headquarters in Philadelphia. He joined the company in 1913, and has been connected with his present department since 1916.

»

T. C. Williams, recently discharged as a captain in the 15th Air Force after 30 months in Europe, has resumed his duties as a petroleum engineer for the Texas Railroad Commission in the Midland, Texas, district.

»

Fay Coil, veteran of World War II and a geologist for The Superior Oil Company of California, has been placed in charge of the firm's West Texas-New Mexico district geological staff, with headquarters at Midland, Texas. He succeeds **Miss Maria Spencer,** who was transferred to Amarillo.

»

Thornton Davis, geologist for Peerless Oil & Gas Company, San Antonio, was elected president of the South Texas Geological Society. **Marion J. Moore** of Transwestern Oil Company, was named vice president. Other officers include **P. B. Hinyard,** Shell Oil Company, secretary-treasurer, and **Leavitt Corning,** independent consultant, member of the executive committee.

»

Leslie S. Sinclair, vice president and a director of the Magnolia Petroleum Company, Dallas, and an employe since May, 1914, has retired due to impaired health.

»

Marvin S. Jones, a captain in the Army Engineers with 3½ years of service, including duty in the South Pacific, has returned to Magnolia Petroleum Company as scout in the San Antonio district.

»

Edward R. Valentine, vice president of Fullerton Oil Company, has been elected to the board of directors of the California State Chamber of Commerce.

AS A DAM HOLDS BACK THE FLOOD...
EAGLE LEAD WOOL
holds back bottom water!
Why take chances? Be ready to crack down on bottom water the minute it shows by tamping a cartridge of Eagle Lead Wool into the well. Eagle Lead Wool saves you time, oil and money. Its fine, flexible strands effectively pack every crack and corner, become a solid, snug-fitting plug, permanent and non-corrosive. Eagle Lead Wool comes in convenient 50 pound sacks, easy to place in special EagleWire Containers sized to fit all casings. Order through your jobber today!
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Seals off bottom water —keeps 'em flowing!
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Ting Chang of China is in the United States by invitation of International Training Administration, Inc., of Washington, D. C., to study American-made drilling and exploration equipment. After a year's visit Chang will return to become a consultant to the Chinese government in the purchase of oil field equipment. Before the war he was connected with the Kansu Petroleum Administration in Chunking.

Ting Chang

J. D. Sanford, C. G. McCaleb of San Antonio and **J. S. Lehmann** of St. Louis, Mo., have incorporated the Rock Hill Drilling Company to operate in Texas with capital stock of $29,800. Headquarters are in the Milam Building, San Antonio.

J. W. Bates, Sr., of Tulsa, **C. P. Baker** and **G. M. Reading,** both of Odessa, Texas, and **D. E. Reading** of Livingston, Texas, have incorporated the B. & B. Drilling Company. Headquarters have been established at Odessa.

Lawrence Vander Leck, Los Angeles oil man, has been elected president of the Pasadena Community Chest.

Jacob France, Tulsa, president of Mid-Continent Petroleum Corporation and oldest employe in point of service, was elected chairman of the board, a newly created position. **Fred B. Koontz** of Tulsa, vice president in charge of manufacturing, was elected president.

Edwin J. Glocke, general auditor of Socony-Vacuum Oil Company, Inc., since 1944, has been appointed assistant comptroller. He was named treasurer and director of the Lubrite Refining Corporation in 1932 and was transferred to the comptroller's department in New York in 1935. **William V. Carver,** former assistant general auditor for Socony, succeeds Glocke. **George F. Johnston,** who has been handling special assignments for the comptroller, has been appointed manager of the Systems and Planning Department of Socony.

Victor Zoller, formerly with The Atlantic Refining Company, Tulsa, before entering service with the Navy, has joined the Chicago Corporation as assistant geologist at Shreveport.

Malcolm P. Ferguson has been elected president of Bendix Aviation Corporation to succeed **Ernest R. Breech,** who resigned to become a vice president and director of the Ford Motor Company. Ferguson has been a director and vice president of Bendix. He began his career with Eclipse Machine Company, acquired by Bendix in 1929, after graduation from Syracuse University as a mechanical engineer.

John D. McCamey, Tulsa, assistant to the personnel director for The Carter Oil Company, was awarded the Legion of Merit award for "exceptionally meritorious conduct" in Italy. McCamey recently returned to Carter after 28 months of overseas duty as a major in the air corps.

James S. Cook, H. Vinson Grice and **Nicholas F. Roberts** have been named assistant cashiers of the Republic National Bank, Dallas.

Virgil Flemming, Tulsa oil field equipment engineer, has been appointed sales representative for Larkin Packer Company, Inc., St. Louis. His sales territory will include Tulsa, Bartlesville, Ponca City, Fort Worth and Dallas. Flemming recently returned from Washington, where he spent the war years as an engineer for the Ordnance Department. He replaces **S. M. (Puny) Blevens,** now vice president and sales manager for C. W. Cotton Supply Company.

From your smallest to your largest well, there is a Thompson Shale Separator and Sample Machine to meet your most critical mud cleaning requirements. Saves You Money . . . by removing destructive shale and abrasives from drilling mud, thus reducing wear and tear on costly drilling equipment. Sample Machine attachment provides accurate foot by foot samples of cuttings. We can deliver Now! Order through your supply dealer or direct from the factory.

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The PETROLEUM REGISTER, national and international oil directory, recently issued its 24th Annual Edition, a complete revised record of all branches of the industry with detailed data on Producers, Drilling Contractors, Refiners, Pipe Lines, Marketers and Jobbers, Natural Gasoline Mfrs., etc.
Recent advertisements of the MIDWEST OIL REGISTER in oil journals has caused confusion among many in the industry, who, noting the similarity in names, believe it to be connected in some way with the PETROLEUM REGISTER.
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MEN IN THE INDUSTRY NEWS

Charles Ulrick Bay, president of Bay Petroleum Corporation, Denver, has been nominated by **President Truman** to be ambassador to Norway. Bay founded the Bay Company of Bridgeport in 1915, a firm which later merged with Parke Davis & Company in 1931. He is also senior partner of A. H. Kidder & Company, member of the New York Stock Exchange, a director and president of Connecticut Railway & Lighting Company, a director of American Export Lines, and director and chairman of the executive committee of the First National Bank of Bridgeport.

Charles Ulrick Bay

J. C. Hamilton was named vice president in charge of rates and valuations for Arkansas Louisiana Gas Company. He became associated with the public utility business upon his graduation from college, and is recognized as an authority on natural gas rates and valuations, appearing in that capacity before many state and national rate and valuation hearings. Hamilton was head of the rate and valuation department and assistant secretary of the company before his promotion. He has been with the company for 27 years.

J. C. Hamilton

Deaths

William Albert Wise, 71, died at Tyler, Texas, May 10 after a brief illness. He was a pioneer oil man, starting out in his native town of Bradford, Penn. The development of the oil industry took him to southern Kentucky, Oklahoma, and finally to Texas in 1931, shortly after the discovery of the East Texas field. He was one of the founders of Miller Sand Pump Company, president of Jackson, Wise & Sneddem, Inc., and a director of the American National Bank of Sapulpa.

Walter M. Mount, 67, president of Central Steel Company, Sand Springs, Okla., died at Oil City, Pa., May 16. He had lived in Tulsa 25 years, and was a member of the old Mount-Cooper Boiler Manufacturing Company. He was a director of the Graver Tank Manufacturing Corporation in East Chicago, Ill.

Eugene S. Adkins, 49, Tulsa independent oil operator, died in a Vinita, Okla., hospital May 16 of a heart attack. He was a member of the firm of Adkins Oil Producers, and had lived in Tulsa 30 years. Adkins acquired considerable properties in Illinois during that state's oil boom. He was one of Tulsa's largest independent operators.

Thomas T. Curtis, 71, retired well contractor for Sterling Oil & Gas Company, Tulsa, died in Tulsa May 19. A native of Queenstown, Pa., Curtis moved west as oil development spread through Ohio, Indiana, Illinois, and down into the southwest.

Lawrence Thomas Miller, 54, employe of Oklahoma Natural Gas Company for many years, died at his home in Tulsa May 18.

Victor H. Martin, 69, who helped develop a number of Oklahoma oil pools, died of a heart attack May 18 at Winfield, Kansas.

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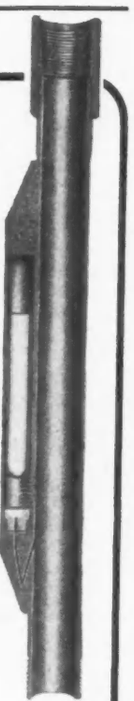
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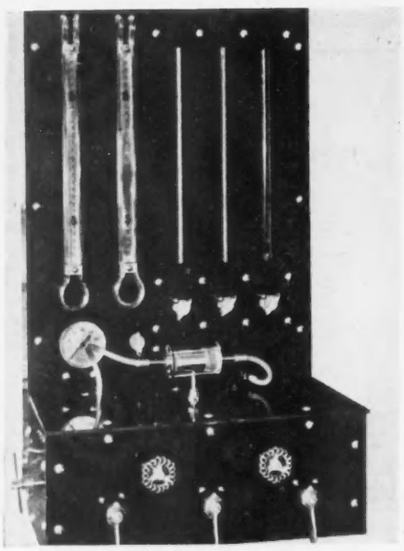
New Device Expands Services Offered Industry by Core Firm

Core Laboratories, Inc., has expanded its services with a new apparatus for the measurement of relative permeability to gas. The device is the product of the firm's research department, and was as-



sembled by John D. Wisenbaker and Henry Lewelling under the direction of Dr. Frank C. Kelton. The apparatus measures the relative permeability to gas at a number of saturations covering the range normally encountered in reservoirs during pressure decline. Core Laboratories, Inc., plans to make these permeability measurements on oil-productive formations which are core analyzed on location, and to use these data in presenting estimates of pressure decline and gas-oil raito versus oil recovery.

Fowler McCormick Named Chairman Of International Harvester Board

International Harvester Company at Chicago has announced further changes in the general administrative reorganization begun two years ago with the adoption of the divisional form of organization. Fowler McCormick, former president, has been elected chairman of the board under a new plan whereby the chairman for the first time becomes an officer of the company. As chairman he will be chief executive officer of the company, in general and active charge of its affairs, as well as chief policy maker.

He replaces Judson F. Stone, who resigned the position, but will continue as a director and a member of the executive committee of the board. The office of chairman of the executive committee of the board of directors is discontinued. Sydney G. McAllister, former chairman, will continue to serve as a director and member of the executive committee. John L. McCaffery, former first vice president, has been elected president to succeed McCormick. The president is now chief operating officer and has general charge of the business operations, the direction of other officers, and the appointment and direction of all other employees.

The offices of first and second vice presidents have been eliminated. The president will have as his assistants two executive vice presidents: W. E. Worth, former second vice president, and P. V. Moulder, former vice president in charge of the motor truck division. W. C. Schumacher has been promoted from sales manager of that division to general manager.

Bethlehem Supply to Establish Headquarters in Tulsa Building

The Bethlehem Supply Company of Tulsa has purchased a five-story office building in Tulsa to be used as executive headquarters.

Purchase of the building, formerly known as the Central Bank, in the heart of Tulsa, was announced by G. A. Thompson, executive vice president of Bethlehem. Price involved was $350,000, according to Thompson.

Heretofore, various branches of the Bethlehem company have been scattered in several downtown office buildings. Thompson declared that for the first time in ten years the move will result in all departments of the company being in one centralized office.

West Texas Store Being Opened By The Failing Supply Company

The Failing Supply Company is establishing a store at Midland, Texas, to serve customers in West Texas. Remodeling of a recently purchased building is under way, and the store will then be stocked with a complete line of parts and equipment for Failing Drills.

Oil Well Manufacturing Official Visits Central, South America

Best Dawson, manager of domestic and foreign sales for Oil Well Manufacturing Corporation, Los Angeles, is on a business trip through oil production areas in Mexico, Peru, Ecuador, Colombia, Venezuela, Trinidad, Haiti and Cuba. He will return in the latter part of August or early September.

Best Dawson

Glen M. Simms, formerly with Dunlap Bit Company in the San Joaquin Valley area, now is Southern California representative for the company handling Los Angeles Basin and Coastal fields. Ed Abbott, Jr., who recently returned from the Navy, has been San Joaquin Valley representative for the company since the first of the year. His headquarters are in Bakersfield. Prior to entering the Navy, Abbott was with Hughes Tool Company in the San Joaquin Valley area.

Texas Branch Offices Opened by Stewart & Stevenson Services

Stewart & Stevenson Services of Houston, manufacturers of rig lighting plants, generator sets, and a new auxiliary combination power unit for oil field operation, has opened branch offices in Corpus Christi, Dallas and McAllen, Texas. Charles Ward is manager of the Dallas office. Dick Conolly manager at Corpus Christi, and C. F. Beal service manager at McAllen.

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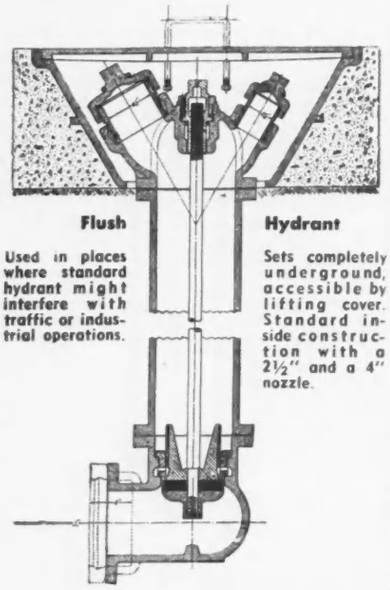

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Sets completely underground, accessible by lifting cover. Standard inside construction with a 2½" and a 4" nozzle.

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Instrument Society Exhibit Set For Pittsburgh in September

The First National Instrument Conference and Exhibit of the Instrument Society of America will be held in the William Penn Hotel, Pittsburgh, September 16-20, 1946. More than 1500 instrument men and engineers are expected.

R. J. S. Pigott, general chairman of the conference, has arranged a program of 15 sessions. Paul Exline, chairman of the exhibit committee, said 80 manufacturers have made reservations and plan to show instruments and controls perfected during the war.

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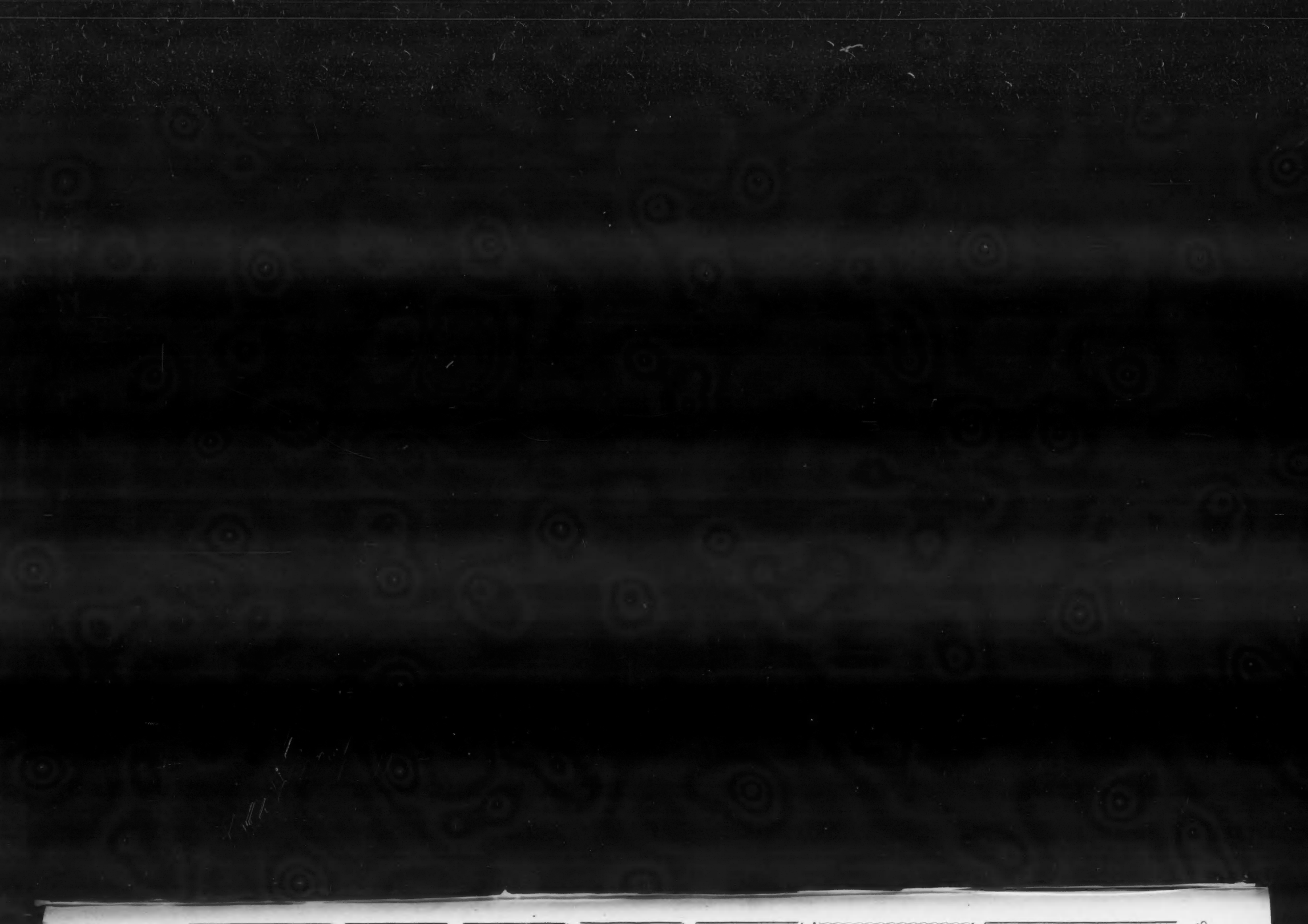

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Monthly International Section

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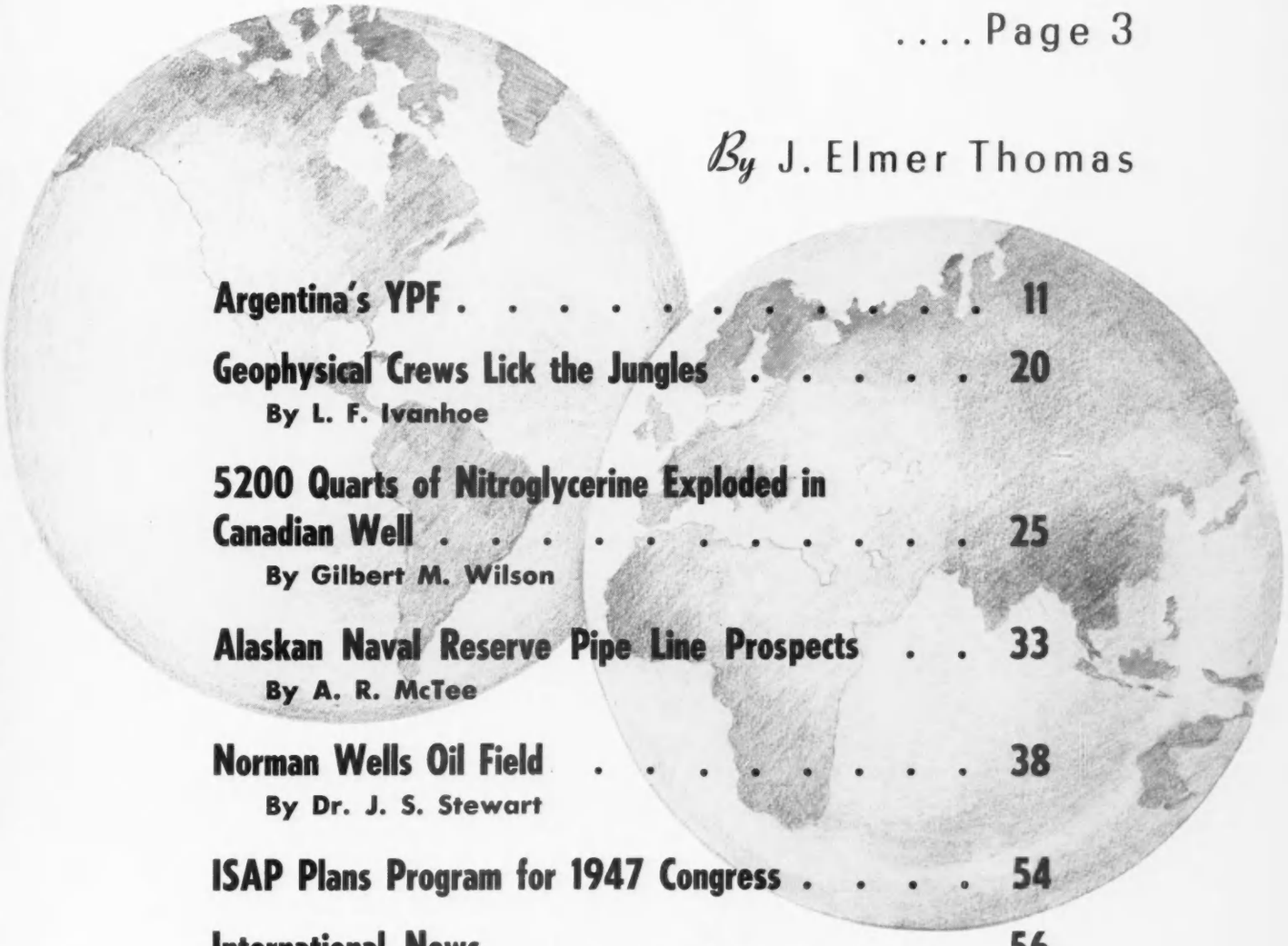

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THE BROWN L-12 PACKER

The new L-12 Packer is our answer to present and future packing problems presented by the higher pressures and greater depths at which wells are being completed. Designed particularly for this service, the L-12 has a number of unique improvements which enable it to support the tremendous loads encountered at 18,000 to 20,000 feet.

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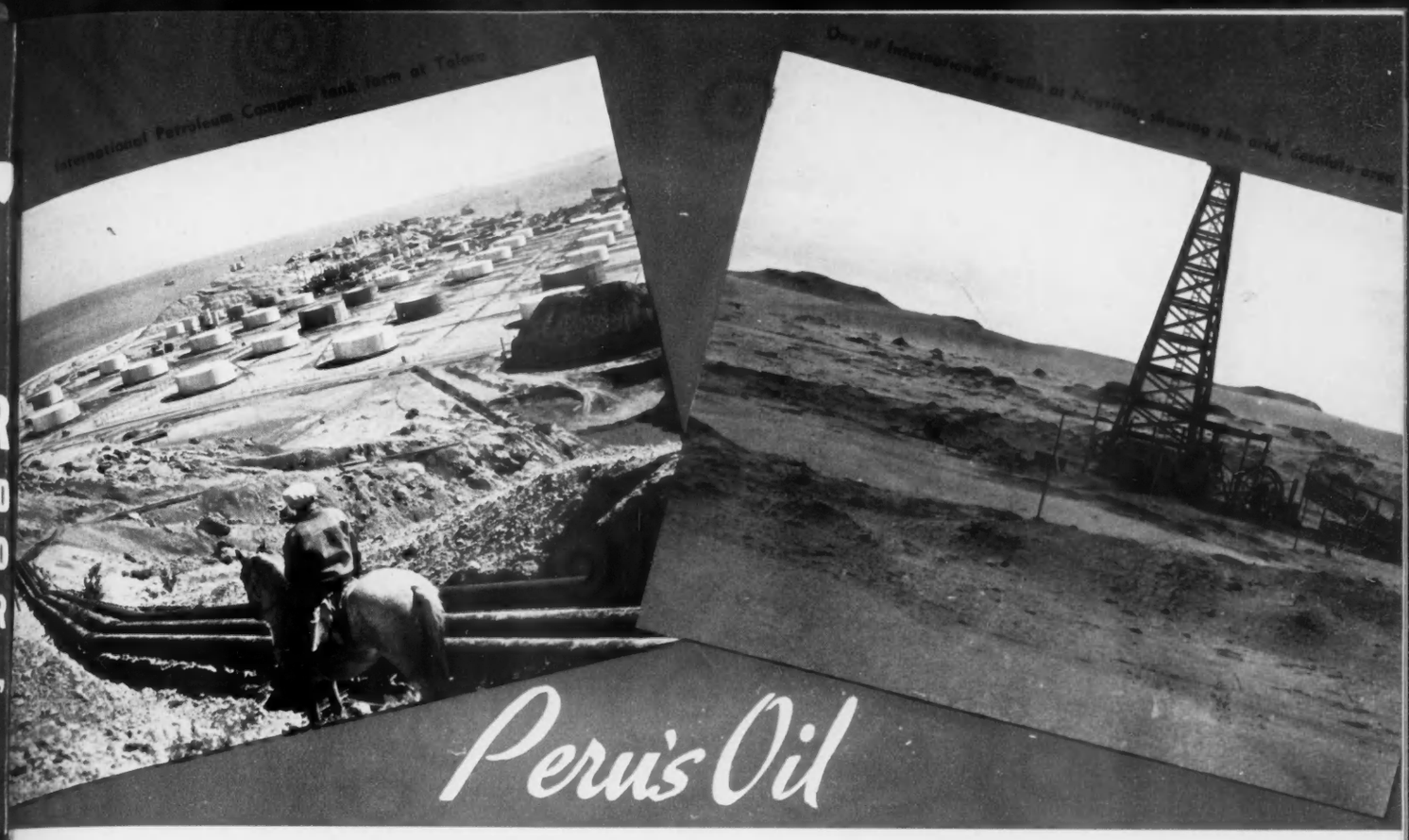

Peruvian Government Has Nearly Doubled Its Output in Reply to War-Time Demand

By J. ELMER THOMAS
Consulting Geologist, Fort Worth

PERU has been listed in the world's producing columns since 1884, antedating all other countries in South America in that respect. It did not attain the 1000 barrels per day class, however, until 20 years later, and reached 10,000 barrels per day in 1921, when the rapid declines at Ranger developed the threat of shortage in the United States and foreign supplies were eagerly sought.

For the past 30 years, as shown in Figure 1, Peru's production has varied from 30,000 to 45,000 barrels per day, always with a substantial exportable surplus. Its 1945 production, exact final figures not yet available, is estimated at 37,000 barrels per day, with International Petroleum Company [Imperial Oil Company of Canada—Standard Oil Company (N. J.)] maintaining its customary 80 percent. Figures for the last three years are given in Table 1, in barrels, by companies.

In addition to crude production, International and Lobitos have a large output of natural gasoline, usually blended with the crude to increase its gravity, but not included in the above figures. Last year's output is not yet reported, but the figures for the two years preceeding are listed below, in barrels.

COMPANY	1944	1943
International	920,865	938,574
Lobitos	112,903	109,914
Total	1,033,768	1,048,488

In former years a large percentage of Peru's surplus production, over and above domestic consuming requirements, was exported as crude to other countries in South and North America. Recently, however, the tendency has been to refine locally the entire output and confine exports to refined products. Lobitos, the British company, operates no refinery, but statistics on the output of the others is given in Table 2.

The estate of La Brea was acquired in fee by International's predecessors.

TABLE 1
Crude Production by Companies

COMPANY	1945	1944	1943
International (Canadian)	11,210,227	11,763,068	12,056,908
Lobitos (British)	1,947,613	2,496,982	2,529,232
Zorritos (Peruvian Government)	139,157	80,736	39,766
Ganso Azul (American)	68,388	45,325	29,592
Total	13,365,385	14,385,911	14,155,498

Consequently, the entire self-contained unit is on company-owned land, oil fields, pipe lines, refinery, tank farm, company camp and the town with its stores, schools, churches, athletic fields, etc. It is a part of that lengthy zone west of the Andes, a desolate waste with barren rocks and shifting sand dunes, which extends from the Bay of Guayaquil almost without interruption to Southern Chile. Only a few, small rivers flow westward into the Pacific, but where they do, and permit of irrigation, there is intensive cultivation, and has been since the time of the Incas. The various levels of irrigated tracts, rising up the valley walls by stages, almost to the arid crest of the plateau, are most interesting to view from the air, as are the rock remnants of early Indian villages occasionally noted. But for the most part, the Pan-American Highway, fully paved across most of Peru, is a sinuous black line in a yellow desert, without a comforting number of filling stations along its route.

The town of Talara, on La Brea Estate, provides more than the usual amounts of comforts for an "oil field town," but the company plans to spend $15 million, as soon as materials again become available, on a complete modernization. International has built and

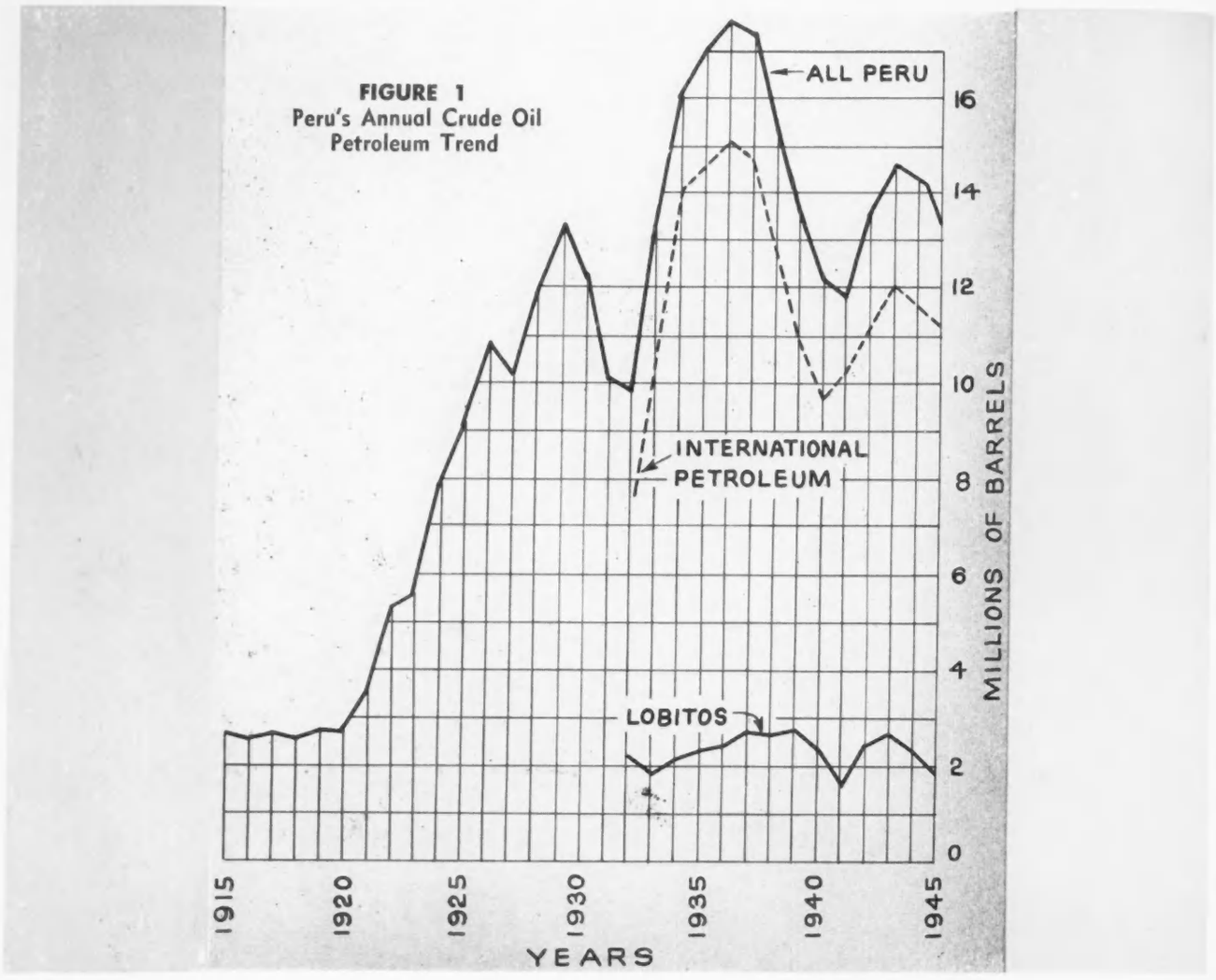

FIGURE 1
Peru's Annual Crude Oil Petroleum Trend

maintains its own schools, giving free education to 4500 children of its employes. Hospitals, churches, athletic fields and playing grounds similary are provided free of cost.

Apart from the coastal fields of International, Lobitos and the Peruvian government near Talara, there is a single producing area in Peru's Montaña, the Agua Caliente field, better known as "Blue Goose," the name of the American company that made the discovery. The story of the Blue Goose began when geologists primarily concerned with a proposed railroad construction noticed in flying over the jungle a peculiar pattern of drainage and vegetation which strongly suggested a domal structure. This led to a surface survey which quickly disclosed a favorable structure. A test was drilled and a "regional wildcat" brought in.

The small setlement at Agua Caliente, named from steaming hot waters flowing from natural springs, was on a navigable stream for 16-foot draft boats during most of the year, but 3000 miles from the mouth of the Amazon. Materials were more readily brought in that way, however, than across the Andes. A good well was completed at 3000 feet. Five have been completed so far, one reported capable of producing 5000 barrels per day, with no dry holes as yet. With an elevation of only 500 feet above sea level at Agua Caliente, and a high mountain range intervening, Western Peru is not in the "marketing territory" for this field. A small skimming plant was built and as much crude is produced and refined as can be marketed along the water courses of that vast inland empire of the Upper Amazon.

Table 2
Products Output by Companies

INTERNATIONAL	1944	1943
Gasoline	3,908,325	4,136,534
Kerosine	997,424	714,454
Diesel Fuel	2,552,705	2,353,382
Bunker Fuel	5,966,209	6,649,442
Lubes	38,498	62,810
Asphalt	71,599	65,833
Coke	505	553
Still Gases and Losses	90,547	84,349
Total	13,625,812	14,067,347

GOVERNMENT (Viller)	1944	1943
Gasoline	117,243	136,141
Kerosine	35,555	38,830
Diesel Fuel	74,837	81,020
Residual Fuel and Losses	110,283	131,604
Total	337,918	387,595

GANSO AZUL (Agua Caliente)	1944	1943
Gasoline	12,669	8,023
Kerosine	10,580	5,567
Diesel	13,211	6,091
Residual Fuel and Losses	12,710	9,183
Total	49,170	28,864

The distribution, of course, is solely by waterways. In the early days drums were made into rafts and floated downstream to supply consumers 200 to 300 miles distant. Then in an "evolution of transportation" tug boats and barges were introduced, carrying drums of petroleum products on their decks. Now large, modern powered tank-barges are in use and the marketing territory has been extended 1000 miles (by the river's course) to Iquitos, Peru, and another 1000 miles to Manaos, Brazil, with Belem on the South Atlantic Coast still another 1000 miles distant.

At Iquitos, formerly a port of call for ships from England, the company has built a large "bulk station." There they have constructed their own plant to make cans for gasoline, kerosine and

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TESTING TYPES
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These medium and heavy-duty Testing Type Packers are built to give longer trouble-free operations under almost any condition. Both packers are equipped with the amazing new Floseal Packing Ring Sets to provide positive pack-off to withstand heat and make possible setting and resetting many times. Each Packer utilizes long, tapered dovetail slips, cross cut for positive action and can be furnished with tool joint or tubing threads for the top and bottom connections as ordered. The BO-D—four or six rings—is heavily constructed to withstand the strain of medium testing work. The BO-E—six rings—is heavier with all vital parts of heat-treated special alloy steels.

Get the full specification of these better Testing Type Packers and see for yourself why operators say "It pays to test with the best!"

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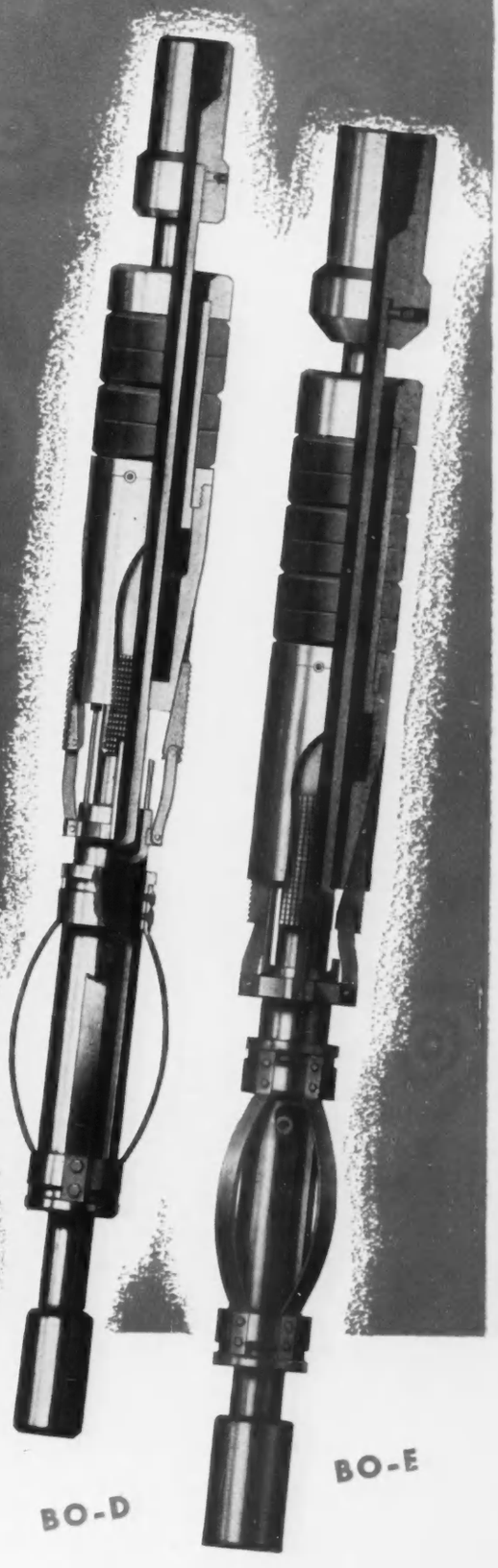

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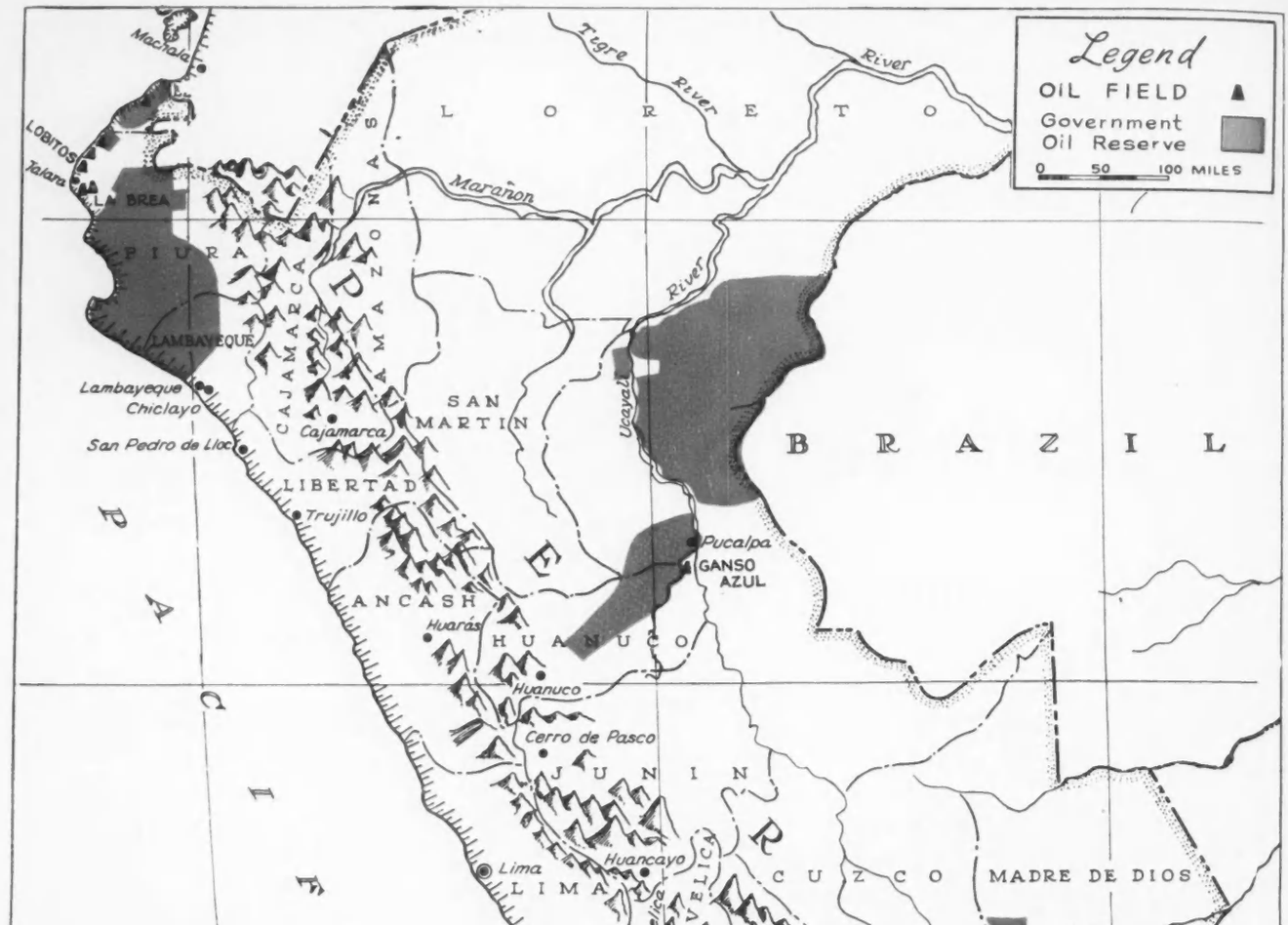

Figure 2. Oil fields and petroleum concessions in Peru.

diesel fuel. Even during the war years the markets were expanded from 40 barrels per day in 1941 to 200 barrels per day in 1945, and it is expected that once materials and equipment become readily available, there will be a marked increase in this river transportation.

The Peruvian government itself has been an important factor in that country's producing operations for the past 15 years and since 1942, under the stimulus of wartime demand, has nearly doubled its oil production. It operates the Zorritos field, the northernmost producing area along the coast, near the town of Tumbes, State of Tumbes, and also Los Organos field in the State of Piura, a small reservation entirely surrounded by the British-owned Lobitos concession.

The government is also wildcatting at Pirin, on the shores of Lake Titicaca and near the Bolivian border. It had formerly furnished some production, 265,000 barrels in all, in this remote area 600 miles southeast of Agua Caliente. It is not presently producing but the Peruvian government continues to drill there. In 1944 test No. 11 was lost in a blow-out, reportedly an inert gas. Well No. 12,

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An oil seepage near the Negritos field. A similar seepage led to the discovery of oil in this district.

An aerial view of Talara and International's tank farm.

now drilling, is perhaps the "highest" well in the world, the derrick floor being 12,800 feet above sea level. The all-time record was probably held by Pirin 1, its derrick floor being 13,100 feet above sea level.

The government is now moving in tools for a test on the Ucayali River 125 miles north of Agua Caliente and only a short distance across the river from the location recently made by the Compañia Petroleo de Oriente on a small concession almost surrounded by federal oil reserves. This government project, as well as the Pirin wildcat and the producing areas on the northwest coast . . . a linear extent of 1100 miles . . . are all connected to the Lima headquarters by radio-telephone. Dr. A. Cabrera La Rosa, head of the Petroleum Division of the Ministry of Fomento, thus maintains constant communication with his far-flung operations.

Peru's Montaña

A glance at the map shown in Figure 2 shows by the drainage pattern that about 5/6 of Peru's entire 532,000 square miles lies in Amazon Valley drainage. Most of the population and all the industry are west of the mountains, however, in that narrow, semi-arid belt. The dense tropical jungle of the headwaters of the Amazon, with its very heavy rainfall, supports only a small population and consequently there is only a meager petroleum demand, but it is an area which one day may be settled by immigrants and reclaimed from the jungle, when the problems of growing crops in such an area have been solved.

Its interesting prospects for oil, in formations ranging from the Devonian to the Cretaceous and possibly Tertiary, have drawn interest for at least a quarter century within the memory of the writer, and most developments along the Sub-Andean Zone, from Venezuela to Patagonia, have enhanced that interest. No encouraging occurrences of oil production, however, have offered any solution to the problem of deriving a profit from what would necessarily be large scale and expensive exploration and development at such distances from a consuming market or from any point of entry into the oil markets of the world.

This huge inland empire lies only 200 to 1000 miles from the West Coast, but separated from it by a mountain range which passes 12,000 to 14,000 feet high and with peaks extending to 15,000 and 20,000 feet above sea level. It is, furthermore, 2000 to 3000 miles from the East Coast, down the tortuous channels, with frequent and shifting sand bars, of the Amazon and its upper tributaries. Added to that is a climate very trying for most Anglo-Saxons over a large part of the area and some Indian tribes quite as deadly as the tropical diseases.

It may be conquered, eventually, with civilization's newest equipment, airplanes, air-conditioning and the new drugs which ward off or cure many of the difficult diseases of the past. But it will not be done soon, nor cheaply. It offers little inducement to the independent producers, for many years the real spark plugs of the domestic oil industry, whose horizons seem to be narrowing rapidly. Rather it seems suitable only for the very largest units of capital, or for groups of such units.

International's gasoline plant at Negritos.

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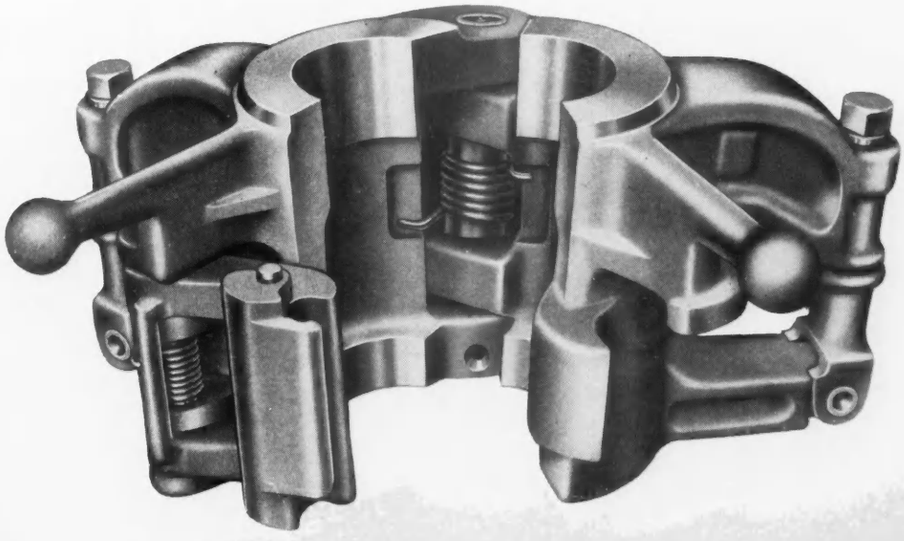

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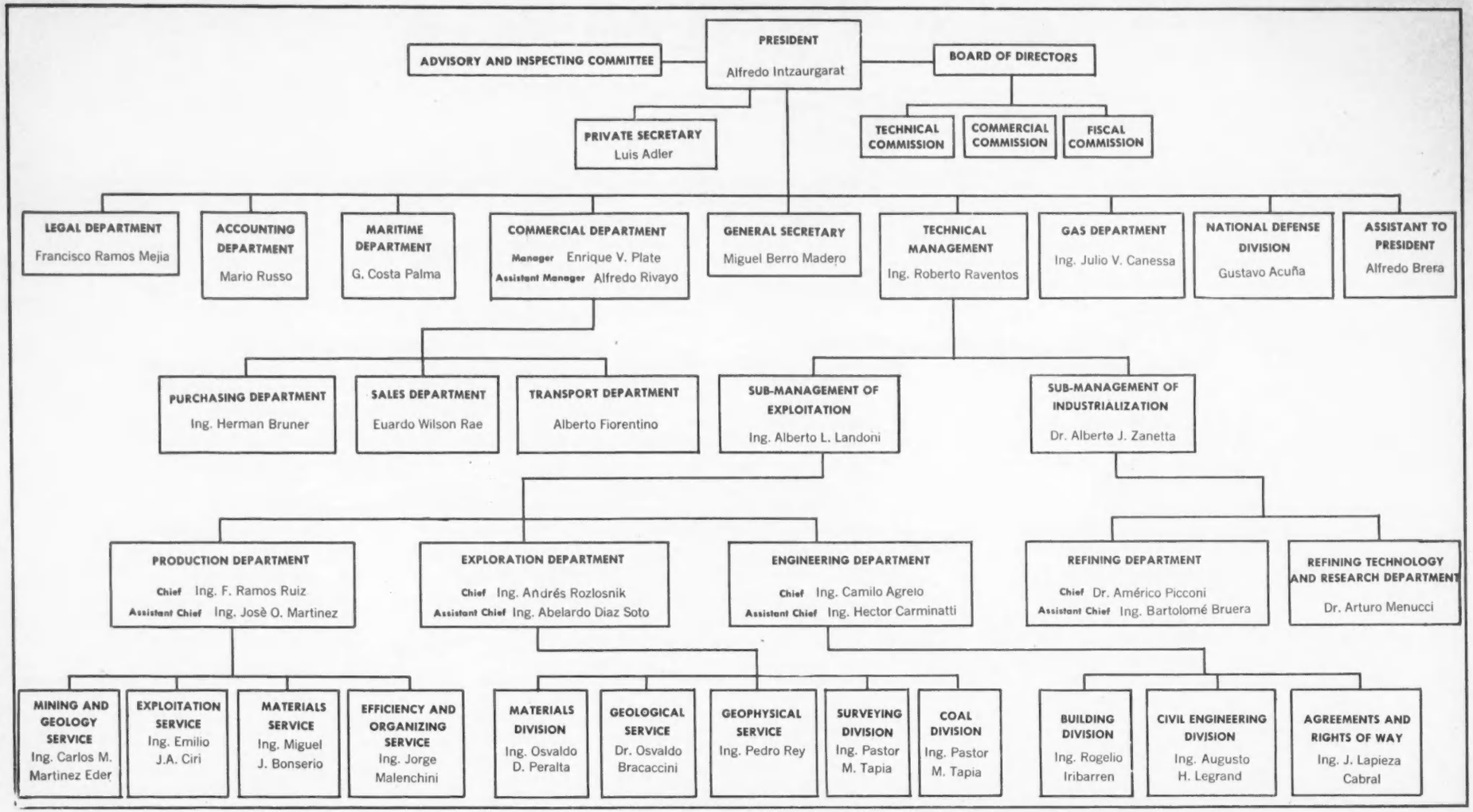
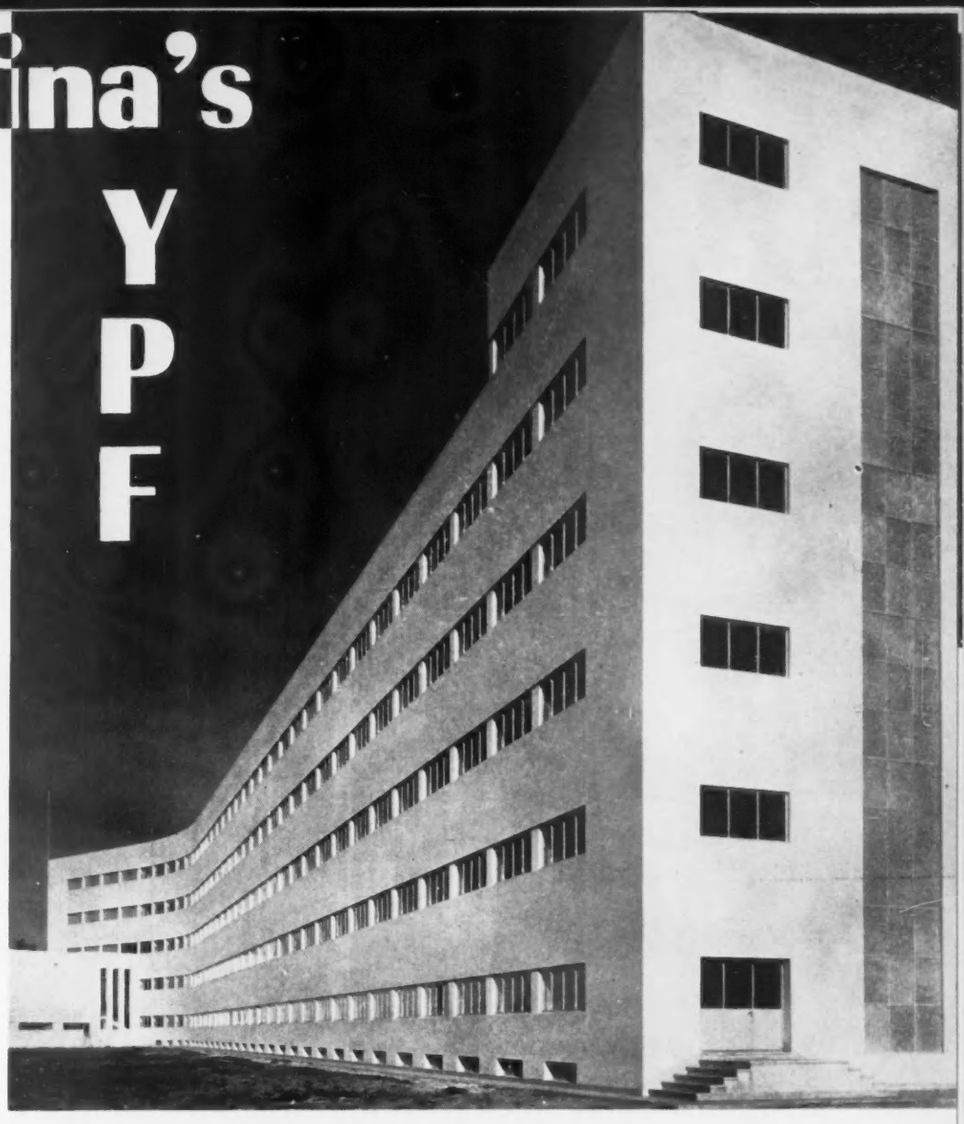


YPF Organization Chart

Argentina's YPF

Part 1

By J. ELMER THOMAS



YPF research laboratory at Florencia Varela, near Buenos Aires

OF THE several nations which have undertaken their own oil operations, Argentina has been most successful in finding and building its own crude oil supply. From the 100 barrels produced in 1907 to the 15 million barrels produced in 1945, there is presented a study in slow but almost uninterrupted growth.

As production mounted, pipe lines, refineries, tankers, bulk depots, tank trucks and service stations were added until there is now a fully integrated, well-balanced operation with assets in excess of $250 million (U. S.). Illustrative of the elaborate form it has taken is the accompanying organization chart, which shows the names and titles of the top management only.

From the Andean foot-hills in Salta and Jujuy on the north, where tightly folded and faulted over-thrust anticlines furnished oil seepages, to the Baldwin Range of Tierra del Fuego on the south, where gas seepages are numerous, is a spread of 2250 miles. Argentina's area, 1,153,110 square miles, is 38 percent of that of the continental United States, and much of it is regarded as favorable for petroleum prospecting.

Argentina has a fairly equable, temperate climate and much of the country is comparatively accessible, although some large areas are not well opened to transportation. Its proper and complete exploration for oil will be a question of time, money, properly trained personnel and the selection of suitable methods. A touch of the "competitive spirit" might also be a useful ingredient.

First Exploration

The first recorded efforts at petroleum prospecting were in 1865, when the Jujuy Legislature approved a charter for the Compañia Jujeña de Kerosina. Farther south, in Mendoza, the Compañia Mendocina de Petroleo started operations in 1885 and drilled several wells, some with a little oil, but commercial production was not established until 1907 at Comodoro Rivadavia. The Minister of Agriculture had sent a drilling rig of the Department of Mines, Geology and Hydrology down to an arid region in Southeastern Chubút, on the shores of the Gulf of San Jorge in search of water. On December 13, 1907, the second test struck oil. Thus the story of YPF is a story of the last 38 years, about half the span of U. S. oil-production history.

Governmental Management

After its accidental birth in the Department of Mines of the Ministry of Agriculture, a general department for petroleum exploration in Comodoro Rivadavia was created in 1910. This continued until 1917, when a naval captain was appointed administrator, though still under the Ministry of Agriculture, a peculiar connection that exists in several other countries of South America. In 1922 the Yacimientos Petroliferos Fiscales ("Government Oil Fields") was organized, also under the Ministry of Agriculture, with an administrator and a technical manager. There was also organized at that time a Yacimientos Petroliferos Plaza Huincúl (Neuquén) where oil had been struck in 1915 and which was slowly coming into some prominence.

In 1923, at the suggestion of the director, Col. Ing. D. Enrique Mosconi, the department was made autonomous, precise terms of organization were set forth and the General Direction (president and board) given certain powers. That arrangement still exists but in 1944 its supervision was transferred to the Ministry of Commerce and Industry. YPF is organized in part as a government bureau similar to the Bureau of Mines in our Interior Department, and in part as a corporation, such as one of the RFC companies such as Defense Plants Corporation. It has a president and board of directors numbering six, the personnel of which is changed from time to time. Two of the directors concern themselves principally with exploration and production, two of them with refining and marketing, and two with finances.

The General Management

The staff at company headquarters in Buenos Aires for the most part started with the YPF as engineers, even those now concerned with sales, purchasing, traffic and other "business de-

YPF main office, Buenos Aires. This building, along with several adjacent structures, is owned and fully occupied by YPF.

Central area of the Comodoro Rivadavia field

partments." An interesting feature prevalent in most of their business experiences is the frequent shifting from one producing district, or refinery, to another, and even from one department to another. Most of those who have attained leadership in the general management have had wide and varied training in the organization.

Besides the headquarters officials shown in the organization chart for Buenos Aires, their assistants and staffs, there are comparable chiefs and assistants and staffs in the various classifications and departments in each of the four oil producing districts and five refining centers. And in addition to the operating personnel at the general management headquarters in Buenos Aires, there is a group of technical advisors for each department not shown on the organization chart. These men include the following:

Ing. Francisco Garcia Ginto, production; Ing. Alejandro Ugarte, production; Ing. Bernardo Rikles, refining; Ing. Carlos T. Campodonico, drilling; Ing. Eduardo-Saubidet Bilbao, engineering; Dr. Julio Aguirre Celiz, legal; and Capt. Alfredo F. Constante, commercial and transportation.

Headquarters Office

In 1929 YPF purchased a building on Avenida Paseo Colón, Buenos Aires. The organization's rapid expansion in the next few years outgrew those accommodations and in 1938 YPF constructed and fully occupied a modern ten-story office building, specially arranged to meet its needs, at 777 Avenida Roque Saenz Peña (Diagonal Norte), one of the handsomest structures in the nation's capital. From these central headquarters radio-telephone equipment affords the general management communication with the four distant producing districts. Already the staff has overflowed into several other office buildings which have also been purchased. These adjoin the main office building so that it can be enlarged.

YPF also has its own office buildings in the four producing areas, where the oil field camps have grown from small towns to modern cities with all modern conveniences provided by the organization. In 1935 there were 2443 salaried employes and 6093 hourly-wage laborers, a total of 8536, on the payrolls, and expenditures reached $17 million (U. S.). In 1945 this had increased to 5839 salaried employes and 16,296 hourly-wage laborers, a total of 22,135, and expenditures in 1944 were $49 million. Last year's figures are not yet available.

Lt. Col. Intzaugarat, president. Has headed the government's oil operations less than two years. Born in Buneos Aires in 1901, he was graduated from the Normal School, and entered the Military Academy in 1919, there he was awarded the honor of being flag bearer of the Institute. Graduated as a second lieutenant in artillery in 1922, he won both "Pro Patria Award" as best student and the "Minister of War Award" as best soldier. He attended the Army's advanced technical school, graduating as military engineer specializing in materials.

He became professor of topography in the advanced military school and in the War College. In 1928 he was sent to Europe with a commission for the purchase of foreign materials and served as secretary of that commission, 1934-38. Returning to Argentina as a captain in the Permanent Commission on Armaments, he was placed in command of a battery of heavy anti-aircraft guns and promoted to major. Served as vice director in the Superior School of Artillery 1939-1943, and was made a lieutenant colonel in 1942. Served as secretary of the Council of National Defense in 1944 and was placed at the head of YPF on April 12, 1944.

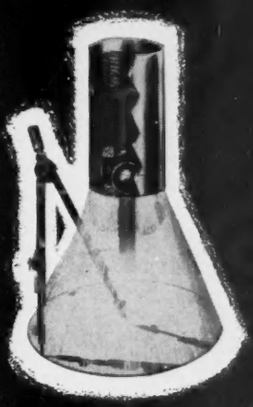
Research Laboratories

A great deal of attention is devoted to research in all departments and YPF owns a modern, spacious and fully equipped laboratory built in 1942 at Florencio Varela, a suburb of Buenos Aires, to house all research activities. Other local research laboratories also are maintained.

Technical Education

To improve the technical education of Argentina's students, YPF has sponsored a great deal of specialized instruction in the high schools and universities and many of its leading engineers serve as part-time professors. In 1926 two courses were offered, development and operation. In 1928 YPF supported establishment of a faculty of physical, natural and exact sciences in the University of Buenos Aires and also an Institute of Petroleum to furnish graduates with superior technical training. In 1932 YPF established scholarships for graduates to go to the United States and continue their studies in geology and petroleum engineering, preparing them to aid in the search for petroleum reserves.

A great many of the older YPF technicians also have received part of their training in the United States, usually after having obtained their engineering degrees from one or another of the leading universities in Argentina, and after having spent some years with the organization in actual operations. This



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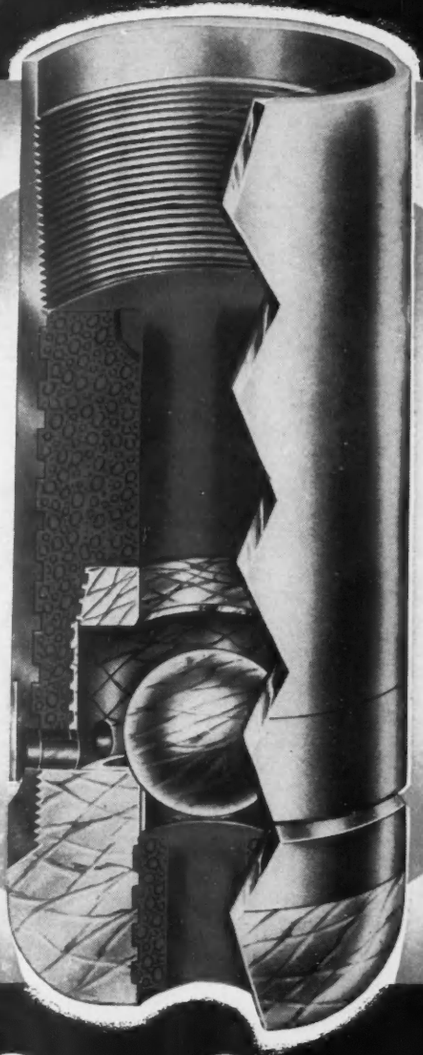

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experience usually has been in more than one type of work and frequently in more than one district.

There is much to be said for this system of extending greater advantages and conditions to men who have already demonstrated their capacity for higher administrative positions. A disadvantage is that such men can least readily be spared from their technical duties and for that reason most of those who have come to this country in the last 20 years have not remained here for full courses of education and training.

A program is under consideration to select men of most promise in the earliest stages of their school work in Argentina and offer them scholarships permitting them to continue their education in our high schools or junior colleges. In this way a larger group can be educated and trained in the U. S. and for a longer term of years.

Welfare Work

In consideration for the health and happiness of its personnel and their families, YPF has not lagged. Comodoro Rivadavia in the early days was a rugged spot with a frontier existence. Now it is a city with pleasant, modern housing, potable running water, electric power and natural gas. It has adequate grams. Free medical, dental and legal advice is supplied; there is a Mutual Benefit Medical Association which includes hospitalization, and YPF maintains its own vacation resorts. Comparable facilities are provided in the three other producing districts.

In addition to its donations to education totalling $600,000 (U. S.) in 1944, YPF made contributions amounting to $1,200,000 (U. S.) for health and police services, paternity and maternity payments, old age pensions and efficiency awards in that year.

Elitor's Note: Development of Argentina's oil industry—oil and gas production, refining, and distribution will be discussed by Mr. Thomas in a companion article on YPF which will appear in the April 1 issue of THE OIL WEEKLY, International Section.

YPF Executives

ENRIQUE VICTOR PLATE, manager, commercial department. Joined accounting department, manager 1914-1917. Rejoined company, commercial department, 1924-1931, sales department 1931-1944. Visited United States and Europe in company's behalf. Named assistant manager operating department May, 1944. Later manager commercial department.

* * *

ING. ROBERTO RAVENTOS, technical manager. Graduated as C. E. University of Buenos Aires 1918. Joined YPF 1921 as assistant engineer at Comodoro Rivadavia. Director exploration division, director of technical service. In 1930 on study mission to U. S., visiting also oil fields Mexico, Venezuela. In 1932 administrator Comodoro Rivadavia and in 1942 joined general management as assistant manager. In 1943 named technical manager.

* * *

JOSE' OVIDIO MARTINEZ, assistant chief, production department. Graduated University of La Plata 1935, mechanical and electrical engineer. Joined YPF as engineer at Plaza Huincul. Chief of production at Comodoro Rivadavia in 1936 and Salta 1937. In 1938 attached to general management on production problems. In 1939 went to U. S. for further studies. Upon return in 1940 chief of production service, at Mendoza; 1941-1942 assistant in the technical service at Comodoro Rivadavia; 1943-1944 chief of exploitation service at Comodoro Rivadavia; 1945 chief of exploitation service production department, general management, until attaining present position, June, 1945.

FEDERICO RAMOS RUIZ, director of the production department. Graduated 1924 from School of Exact Sciences, University of Buenos Aires, as industrial engineer. Joined YPF 1927 as chief of skimming plant, in 1931 chief of cracking plant at the principal refinery, La Plata. Transferred to general management, industrial department, in 1933. Engineering assistant to general management 1934. Studied in U. S. 1935-36. Chief of Exploitation division 1936, chief of service of production 1940, and chief of service of technology 1941, all at Comodoro Rivadavia. Assistant director of production, general management, 1941 and director of production, general Management, 1943.

* * *

CARLOS M. MARTINEZ EDER, chief of the service of mining and geology, production department, general management. Received civil engineering degree 1935 School of Physical, Natural and Exact Sciences, in 1936 degree of petroleum engineer. Joined YPF that year as engineering assistant to manager Cacheuta field, Mendoza district. At Comodoro Rivadavia 1936-1938 engineering assistant to drilling superintendent, then head of drilling school and later chief of drilling division in Manantiales Behr field, Comodoro Rivadavia. In 1938 - 1939 at Mendoza as field manager at Cacheuta, later at Tupungato. In 1940-1941 at Comodoro Rivadavia as district geologist southern district, later geologist in charge of fields in western district. 1941, geology and mining studies division, production department, general management; in 1943 assistant to mining controller, technological service of production department, general management, until appointed to present position 1945.

DR. ALBERTO J. ZANETTA, assistant manager of industrialization. Graduated as Doctor of Chemistry 1924, joined YPF 1925 as chief of laboratory La Plata refinery. In 1928 studied in U. S. In 1935 was again at La Plata refinery and in 1937 as head technologist, becoming administrator of refinery in 1938. In 1940 named chief of Research division of general management, and in 1944 became assistant manager of industrialization.

* * *

EMILIO J. A. CIRI. Head of the exploitation division, production department, general management. Graduated University Buenos Aires in 1935 degree civil engineer, joined YPF as assistant engineer Plaza Huincul. In 1938 chief of drilling and production division Plaza Huincul. To Comodoro Rivadavia 1941 and 1943 to purchasing division, production department, general management. In various capacities with respect to materials problems until 1945, when took present position.

* * *

ING. ALBERTO J. LANDONI, assistant technical manager in charge of exploitation. Graduated University Buenos Aires as Industrial engineer in 1922, joined YPF in 1923 as auxiliary engineer at Comodoro Rivadavia. In 1925 was chief of drilling and production at Plaza Huincul and part - time administrator. In 1927 studied in U. S. Manager of Plaza Huincul district, later joining general management in charge technical inspection, and administrator Mendoza district. In 1938 became director production department and in 1944 assistant technical manager in charge of exploitation.

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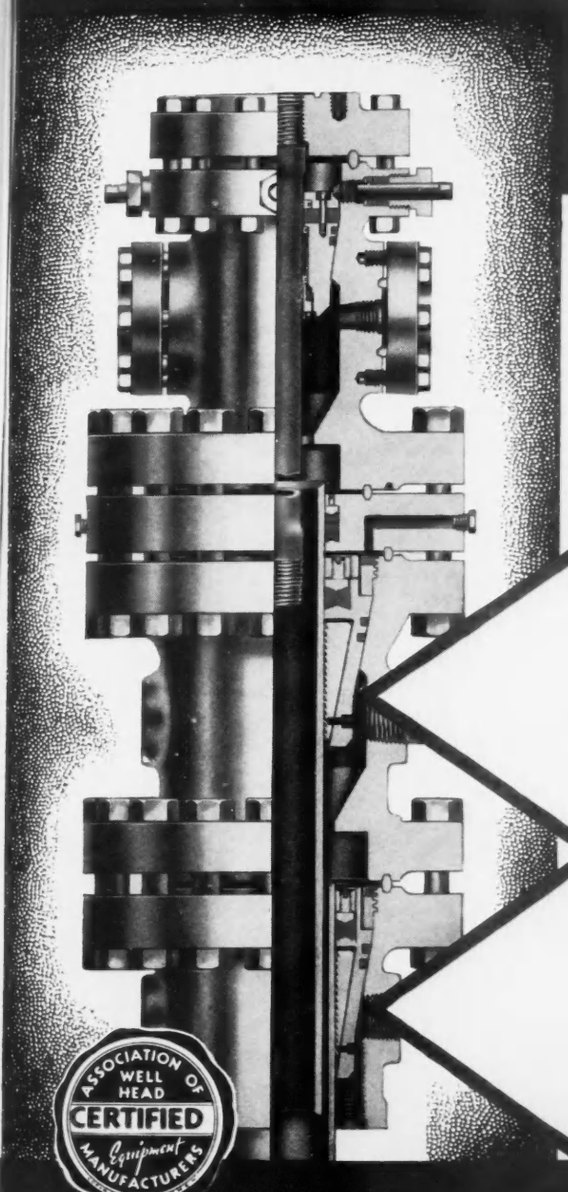

The new McEvoy Type LHCS-2 interchangeable Casing Hanger is especially designed to hold extremely long strings of casing. Danger of bottlenecking is eliminated because the weight of the pipe is distributed evenly over the large slip area which is backed up by a solid housing (not a split housing). Proved by hydraulic tests to have ample capacity to carry the longest strings of pipe being set in today's deepest wells. Proved, too, by field tests on many deep wells of leading companies.

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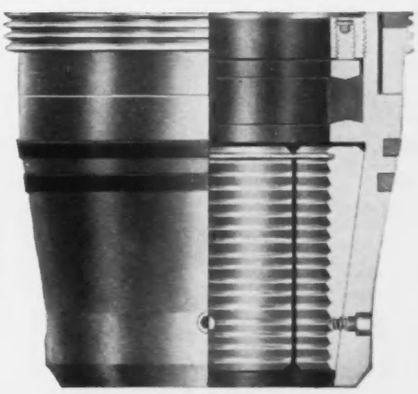

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YPF Executives

MIGUEL J. BONSERIO, head of the materials division, production department, general management. Graduated 1930 School of Physical, Natural and Exact Sciences, University Buenos Aires. Joined YPF 1935 assistant engineer, production department, Comodoro Rivadavia. In 1937 chief of materials division, supplies service Comodoro Rivadavia; 1939-1940 on study commission in U. S. and assistant in technical and commercial office in New York. Returned 1941 to head control and efficiency section, materials division, production department, and assumed present position 1944.

* * *

ING. ANDRES ROZLOSNIK, director of exploration department. Graduated mining engineer in Hungary in 1914, employed in gas fields Transylvania. 1921-1923 with D'Arcy Exploration Company, subsidiary of Anglo-Persian Oil Company, conducting explorations in Hungary. 1923 employed by YPF as chief of service of drilling and production, Comodoro Rivadavia. 1935 assistant chief, 1936 chief of department of mines and geology. Since 1939 director of exploration department and professor in petroleum institute University of Buenos Aires, lecturing on drilling.

* * *

ABELARDO DIAZ SOTO, assistant chief, exploration department, general management. Graduated 1926 School of Physical and Exact Sciences, University La Plata, degrees in mechanical, electrical and civil engineering. Assistant engineer in electrical division Comodoro Rivadavia 1927-1930. Engineering assistant to manager Plaza Huincul 1932-1933. Chief of drilling and production service Plaza Huincul 1933-1938. Chief of drilling service Comodoro Rivadavia 1938-1940. Chief engineer with management at Mendoza 1940-1942. Chief of exploitation service at Comodoro Rivadavia 1942-1943. Chief engineer Comodoro Rivadavia until 1945 when entered present duties.

* * *

ORLANDO OSCAR PERALTA, head of matreials division, exploration department, general management. Graduated 1937 School of Physical Mathematics Sciences, University La Plata degrees of mechanical and electrical engineer. In general management YPF since 1939, when took advanced work geophysics in Petroleum Institute University Buenos Aires, conducted gravity, seismic surveys in Chubut, Mendoza, Salta, Chaco.

DR. OSVALDO BRACACCINI, head of geological division, exploration department, general management. Received Doctor of Natural Sciences (mining and geology) from University Cordoba 1936. Assistant and later chief geological field parties 1936-1939. Continued studies in U. S. 1939. With Continental Oil Company. 1940 again headed geological field parties and 1940 - 1942 chief geologist for northern district. Assistant chief, 1942-1943 of geological division, exploration department, general management, and since 1943 chief of division. Also professor of structural geology in University Buenos Aires.

* * *

PEDRO REY, head of the geophysical division, exploration department, general management. Graduated as civil engineer University Buenos Aires 1930. 1932 joined YPF staff as assistant geophysicist. Party Chief on refraction seismic, gravitimetric, magnetometric and reflection seismic surveys. 1936 - 1937 studied in U. S. Occupied present position since 1940. Also professor of applied geophysics University Buenos Aires and in Superior Technical School, War Department.

* * *

CAMILO R. AGRELO, chief of engineering department. C. E. degree from University Buenos Aires. First employed national highways division Ministry Public Works. Came with YPF in 1924, in various engineering divisions and became head of the engineering department in 1944.

* * *

DR. AMERICO PICCIONI, head of the manufacturing department, general management. Received degree of doctor of chemistry University Buenos Aires in 1919. Attached to national office chemistry, Petroleum Section, 1915 - 1920, when became chemist in YPF Itaca refinery. Superintendent 1921. There until 1938, then at Campana refinery as manager, at La Plata refinery as principal technician and later manager, until 1944, when assumed present duties.

DR. ARTURO MENUCCI, head of research and development division, refining department, general management. Graduated University La Plata doctor of chemistry 1924. Joined YPF in 1926 laboratory chemist in La Plata refinery. Chief of laboratory service. 1940-1942 manager of San Lorenzo refinery, organized research laboratory and became head of it in 1943-1944, when named to present post.

* * *

HERMAN BRUNER, head of purchasing division, marketing department, general management. Graduated civil engineer, University Buenos Aires, 1918. Joined YPF 1919 as project engineer Comodoro Rivadavia. 1923 resigned to join Mining Bureau. Later manager petroleum syndicate. Returned to YPF 1931. Since 1932 attached to general management. 1935-1936 chief of department of purchase and supply of materials. In his present position since September, 1944.

* * *

EDUARDO WILSON-RAE, head of division of sales, marketing department, general management with YPF since 1923. In 1932 helped organize liquefied petroleum gases division. Has headed service station division and organized decentralization of its management into regional divisions. More recently concerned with rationing of fuel and served as head of fuel distribution office until March, 1944, when he reached present position.

* * *

ALBERTO J. FIORENTINO, head of the transportation division of the marketing department. Joined YPF in 1921 and in 1923 became secretary of drilling and production service at Comodoro Rivadavia. In 1932 named secretary of management of that district. Transferred to general management in 1938. Helped organize traffic service, which later became a division, and served as its assistant chief until 1945 when assigned present position.

* * *

ALFREDO RIVAYA, assistant manager, commercial department. Was manager of accounting department, treasurer, chief auditor for sales organization of concession, secretary of sales organization, auditor for sales department, assistant manager of sales department.

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Positioned one or two joints from bottom, it serves as a float valve; also as a stop for the cementing plug, thus retaining cement tailings inside the casing. It is run with a regular Guide Shoe, or a Whirler Guide Shoe in wells of average depth. In deeper wells it is good practice to use this Baker Float Collar with a Baker Cement Wash-Down Whirler Float Shoe, opposite page.

This is a BAKER Cement Guide Casing Shoe

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Generally used with a Baker Cement Float Collar, in wells of average depth, this Shoe is amply strong to guide the longest string of casing safely to bottom. The rounded nose readily passes any side wall irregularities. The plug of Baker-Formula Concrete is easily drilled up and circulated out of the hole.

This is a BAKER Cement Wash-Down Whirler Guide Shoe

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Where bridges, or other formation obstructions are likely to be encountered, this Guide Shoe is used in combination with a Baker Cement Float Collar (above). The Wash-Down Whirler Guide Shoe then safely guides the casing past any wall irregularities, washing the side walls, breaking down bridges, and preparing the hole for a good cement job. When cementing is commenced the Guide Shoe whirls the slurry to uniformly encase the pipe.

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Guiding, Floating and Cementing EVERY String of Casing

GEOPHYSICAL CREWS Lick the Jungles

By L. F. IVANHOE
Seismograph Service Corporation of Delaware

Geophones are set on pipe driven into solid ground.

Laying out geophone cables on swampy terrain

TWEEZERS . . . toothpicks . . . a mimeograph . . . a milling machine . . . a couple hundred pounds of ham—they're easy to get if you live in a city. But it's something else to find them, say, in the jungles at the headwaters of the Orinoco River, and geophysical crews must have a good stock on hand, regardless of where they might be working.

Geophysical exploration work in the far corners of the world must be carefully planned if the work is to be done properly and the crews are to survive. A campaign must be planned in much the same manner that the quartermaster services planned during the war. Consequently, although life on reconnaissance is no picnic, crews manage to get along in tolerable comfort.

Seisdel's 12 crews in Venezuela are located six hours to three days' driving time from Caracas. Some are close to a highway, and others several hours from the nearest road or village. Under these conditions the camps are on their own most of the time.

Self-Sufficiency Vital

Since the self-sufficient crews must be in a position to build roads, feed and shelter the entire personnel (which is often 100 men), provide medical attention, decide legal problems, haul and store gasoline and supplies for all the trucks and equipment, pay the laborers in cash on paydays, repair any and all electric light plants (in addition to the normal duties of surveying, drilling, shooting, recording, and computing), it is obvious that the arrangements to operate these crews are very different from those in the United States.

Each crew is a self-contained village with the party chief not only responsible for seeing that the local laws are obeyed, but also that supplies are ordered on time and not wasted; shelter and food are available for all, water for drinking, cooking and bathing is provided, and in general anything and everything to keep the men alive, happy and at work. All the labor is local and speaks only Spanish. At times the party chief is the only

Surveying on a Seisdel crew in the virgin jungle

The observer's tent is weatherproofed because of frequent rains.

River banks are often used as camp sites to take advantage of water transportation.

American in the crew, but generally there are half a dozen English speaking members in the technical staff, which roughly corresponds to a normal crew in the States.

The chief difference between this work and that at home is that it is impossible to take a truck needing repairs to the local garage; it must be repaired in camp, and all anticipated breakdowns must be guarded against with ample spare parts on hand and yet the crew cannot be incumbered with unnecessary supplies. Spare parts come from Caracas, and sometimes it is a couple of weeks before they arrive. The same is true of food supplies, gasoline, office supplies, medicine and everything else. Very few people live in this part of the country, and only some of the necessities of life are available at very high prices.

Tent Camp

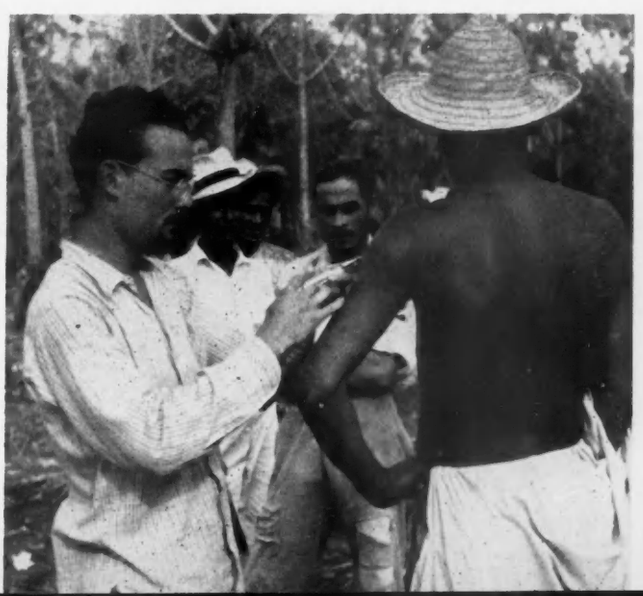
All the camps have more or less the same setup. There is one tent for the computing office, one for the cashier-lawyer, a hospital tent, a recorder's tent, driller's tent, garage tent, laundry tent, and a large mess-club tent. All of them consist of a large tarp which makes a covering nine feet high and 25 feet square when spread over supporting drill pipes. The mess-club tent is about 70 feet long and is made by overlapping three of the standard 25-foot tarps. Windbreaks are constructed of palm leaves over bamboo frames, since both palm leaves and bamboo are plentiful. Besides these work tents, each technical staff man has a personal tent with a bed, light, table, chair and mosquito netting.

Sanitation is primitive but effective with an oil drum shower; also wash basins with pitchers of water and mirrors, as well as a tent boy who takes care of the tents and washing facilities. The tent boy, the cook and the laundrymen have one tent for themselves in the technical camp, but the rest of the national laborers live some distance away in their own camp. The company supplies them with several large tarp-tents and cooking utensils, but does not attempt to cook their food.

The camps are very practical and efficient, since they are supplied with all the necessities, without being so large that they are cumbersome to manage or difficult to move. Every precaution is taken to insure the most complete sanitation and to make them as comfortable and

AN intensive geophysical campaign is now under way in a number of foreign countries, notably in South America and the Middle East. One of the most active firms engaged in this work in South America is Seismograph Service Corporation (of Delaware) with headquarters in Tulsa. To man its crews on the far-flung fronts of petroleum exploration the company has recruited scores of young men, all carefully chosen for intelligence and physical stamina and many of them recently discharged from the armed services. Some of these crews are working in the jungles of Venezuela and Colombia, some on the hot deserts of Arabia, while others are at work in the frozen north.

L. F. Ivanhoe, with the Seismograph Service in Venezuela, recently reported on the activities of a "Seisdel" crew engaged in an extensive geophysical survey in South America. His interesting account of activities, accompanied with on-the-ground pictures snapped in the jungles by S. E. Lane of Bogota, Colombia, is presented herewith.



To the doctor who is assigned to each crew may be attributed much of its excellent health record.

Portable drills can be easily disassembled and carried to new locations by the helpers or on burros.

"The ghost walks in the jungle" . . . it's pay day for the local employes of a Seisdel crew

pleasant as possible. They are laid out with careful attention to the relationship of the various parts. After a suitable location is found, the camp is set up with the technical part upwind from the remainder to insure a minimum of noise, dust, odors, etc. All of the tents are conveniently and comfortably arranged and are provided with a small electric plant which supplies energy for the refrigerator and the lights.

The company furnishes all bedding, towels, soap, food — in short almost everything except personal articles such as clothing, tobacco, etc. Books and magazines are supplied and some of the older crews have built up small libraries. In many places the grass is trimmed and the tree trunks whitewashed, which add to the appearance of the camp.

Recreation Limited

The means of amusement are limited, but in certain areas deer and ducks are hunted with shotguns or ball shells. Fishing is rare, although in some regions it is possible to fish with dynamite. Baseball is played in many camps, both by the nationals and the Americans. Several sports which require little equipment, such as badminton, are practical. As a whole, the individuals find their own means of recreation, read a great deal, and find the camp a wonderful place to do those things that people never find time for at home.

The company has started a system of rest leaves for the field men. Each field man is given one week local leave every three months, thus enabling him to get into a sizeable town, enjoy a change of scenery, take care of personal business and blow off steam in general. Many of the men do not take this leave, since they are quite content to stay in the field, some for many months before ever making a trip into the city . . . by preference, not by necessity.

The food in the camps is the best that can be provided and personal tastes are respected. Some newcomers try to fill up on olives and other items, but soon tire of them and return to the old stand-bys.

Many of the cooks are Chinese. Individual tastes are most apparent at breakfast when a man may order anything from the regular eggs, juice, toast, and breakfast food to any kind of prepared meats, tamales, sardines, steak, or onions. The stoves are modern gasoline ranges and the cooks even make their own bread and pastries. Large pitchers of iced tea and lemonade are always available in the ice box. Supplied usually come from Caracas, so there is always two or three weeks' supply on hand to carry the crew through any emergencies.

Dog's Life

Most of the camps have a large assortment of pets. Dogs, pigs, deer, parrots, hawks, pheasants add to the color of the camps. The best life in a geophysical campaign in Venezuela is that of a dog—nothing to do but eat, sleep and be petted. The parrots and deer are usually pests, since they eat bars of soap, shaving cream, shirts, and any other loose articles. Some of the crews have small monkeys. There are some snakes in the vicinity and once in a while one sees an anteater and large red ants, which look very ferocious.

The Venezuela weather is pleasant, the nights cool, and during the day it is comfortable to remove one's shirt for sun tan. Clothing depends entirely on what the employe happens to have. There are no rules. Some of the fellows (usually the surveyors) prefer to wear boots, but the rest of the technical staff find them quite warm, and around the camp, low shoes or even slippers are worn. T-shirts are very practical for the field since they can be easily laundered and need no ironing. In the evenings a shirt is desired by some individuals, both for the warmth and as a protection against bugs. Many of the shirts have the sleeves cut off. Pants are of any type. Hats are seldom used, but the cloth type is most popular. Sweaters and jackets are not needed in the field, since if it is cold, an undershirt can be worn under a shirt during the first hours of the day. A rain-jacket of the oiled silk type is handy as are raincoats of the same type and weight.

Comfortable Life

Dress clothes are needed only when a person is in Caracas, and for that reason the field men leave their suits and dress clothes in the company apartment of the Edificio Veroes or at the American Club. In this manner, their dress clothes are always in the city, and need not be carefully packed nor worried about for dust, bugs, mildew, etc.

As a whole, life in the field camps is pleasant and comfortable. The men are in good spirits although newcomers usually need a period of adjustment to understand the Venezuelans. As long as a person stays in camp, there are no expenses except for tobacco, etc. If the boys feel like a beer, they go to the local village, which is usually some distance away. It is possible to save almost all your salary, but only a few do. Normally a bachelor can save about $4000 in two years without much trouble. As elsewhere one's capacity to save varies with his willingness to go out on a spree with the boys. Sprees come high here, too.

A small "expeditionary force" is assembled each morning at the start of the field operations

5200 Quarts of Nitroglycerine Exploded in Canadian Well

West Flank 2, Turner Valley well in which 5200 quarts of nitroglycerine were exploded back in the voids of the limestone formation. Temperatures of 20 to 40 degrees below zero and high winds (note snow blowing in photo) continually hampered operations. The shot, however, was considered successful from the technical standpoint.

By GILBERT M. WILSON
Staff Writer

THE record-shattering explosion of 5200 quarts of nitroglycerine filling the pore space of a formation some 6900 feet underground, and which was touched off recently by a group of engineers in a Turner Valley (Alberta, Canada) well, has been considered a success, at least from the technological standpoint of conducting an experiment on such a vast scale.

Using a revolutionary method of handling explosives in connection with well rejuvenation, the engineers, employing only the hydrostatic pressure created by an 800-foot column of water above a 3500-foot column of nitroglycerine, successfully forced back into the crevices of the limestone formation all but 28 quarts of the explosive. Heart of the experiment was in the ingenious device, or "gun," which automatically detonated the charge at precisely the time when all but the last few quarts of nitroglycerine had been forced out into the open voids of the formation.

The shot was set off February 4, and while it may be several weeks before the well is properly cleaned out and specific results evaluated, certain indications already point to its having had the desired effect on the formation, and if this belief is borne out by the findings, the method may be widely used in rejuvenating wells in other areas.

The well, West Flank 2, is near the south end of the Turner Valley northwest-southeast trending structure and was drilled and acidized in 1937. Drilled to 6973 feet with rotary tools, the well takes in 400 feet of producing horizon of the Madison limestone, which in this particular area is extremely hard. The string of 6⅝-inch casing is set at approximately 6500 feet, with the 5½-inch hole through the formation being barefoot from there on to bottom. Production had dwindled to only three barrels per day, the well having produced about 200,000 barrels since it was drilled. This figure represents only about 15 percent of the estimated total volume of oil that originally was contained in the formation, calculated on the basis of known porosity and formation thickness, and the fact that the wells in this area are spaced at 40-acre intervals. Because of this relatively low recovery of the estimated total available oil, belief was strong that opening up of crevices back in the formation by filling with explosives would result in considerable additional production. Along with its three barrels per day flow of oil production, the well has produced approximately 5 million cubic feet of gas daily.

Prior to placing of this shot the producing formation was treated with a soap and salt water washing process. A ton of liquid soap was pumped back into the well, followed by 1½ tons of a heavy salt water slurry, standard oil well equipment being used for these operations. The solutions were pumped back into the formation and allowed to remain, their function being to wash oil from the voids in the limestone which later would be filled with nitroglycerine.

Shattering explosion touched off 6900 feet beneath the surface is success from the technological view

An important part of the experiment involved the use of a string of three-inch tubing, the bottom 400 feet of which was of drillable aluminum material and which contained an inner string, or pilot tube, of ¾-inch pipe. At the bottom of the tubing was a specially-prepared perforated shoe. Around the inner pilot tube was packed about 80,000 agate marbles, their bulk filling the annular space between tubing and the pilot tube for about 350 feet up from the shoe. Marbles were employed in this operation only because they presented a uniform medium having a known and constant pore space, which in turn permitted calculation of porosity and permeability of this interval. These were important factors that made possible the precise timing of operations in the final stages of the project.

As each joint of the special tubing was made up and run into the hole, joints of the pilot tubing also were run. In addition, at this stage, the pilot tubing was filled with nitroglycerine. This slim column of explosive, as will be seen later, acted as a "fuse" which transmitted the detonating wave from the automatic gun down to the shoe and from there into the nitro-filled formation.

Special Shoe

The all-important bottom shoe was hung several inches off the bottom of the hole and consisted of a short length of three-inch tubing having perforations cut in it, but which was designed to prevent passage of fluid until exactly the desired moment. The shoe was filled with a special grease compound which remained there until hydrostatic pressure above it became great enough to force the material out through

A portion of the 520 ten-quart copper cans filled with nitroglycerine which were temporarily stored near the well until they were emptied into the tubing. Disposal of the "empty" cans following the well shot constituted a small problem in itself.

the holes, after which the nitroglycerine was then free to enter the hole. A ram or piston-like device resting upon steel shear pins was mounted in the upper part of the shoe, and when sufficient hydraulic head or pressure accumulated atop this ram, the pins sheared, the pressure then released being sufficient to force the grease compound out through the shoe perforations. This allowed nitroglycerine to begin passing on out into the formation. The pins were calibrated to shear at exactly the point when 3500 feet of nitroglycerine and 800 feet of water are in the tubing.

Surrounding the string of special tubing was a 4¾-inch diameter wire screen and the annulus between it and the tubing was filled with clay material. This clay was added for the purpose of cushioning the blow and adding to the tamping effect when the explosion shattered the marble-filled section of the tubing. The aluminum fragments and crushed marbles also were intended to add their share of the tamping effect when the shot went off.

A packer was run on the tubing string, being set at a point approximately 50 feet above the casing shoe. The annular space between tubing and casing above the packer then was filled with water.

Nitroglycerine Poured

Pouring of the 5200 quarts of nitroglycerine in the sub-zero temperature that prevailed throughout the test was looked upon with some apprehension by some of those connected with the project, since it is well known that freezing temperatures have the effect of increasing sensitivity of nitroglycerine type explosives. However, under the expert supervision of the explosives engineers on the job and use of a special anti-freeze compound which was added to the explosive, the pouring was accomplished without incident. Hauling of the nitro in specially-padded trucks from the nearby explosive plant proved to be the most dangerous and critical part of the feat. With the exception of one potentially serious incident and with temperatures hovering between 30 and 40 degrees below zero, trucks succeeded in bringing the last of the 520 ten-quart copper cans out to the well where they were stored in a shed until the explosive was poured into the tubing.

To add a touch of spice to what otherwise might have been a monotonous hauling job, one of the trucks, while enroute to the well, caught fire beneath the touchy cargo, but quick action by all hands succeeded in putting out the fire before it gained appreciable headway.

After the nitroglycerine was poured into the tubing, weather caused a delay of three days before operations could be resumed. This prolonged "storing" of the explosive at 6500 feet below the surface seemed in no way to have affected its original qualities, contrary to what some had believed. Approxi-

Pouring nitroglycerine. The 520 ten-quart copper cans were emptied into a drum filled with water set up on derrick floor. Water cleans nitro and minimizes shock of poured fluid. Explosive was drained out of drum at point midway up the side and delivered to tubing in hose by gravity to well tubing. Spray device at end of hose permitted explosive to spread out along inner sides of tubing, cushioning and retarding flow to bottom of string. Note rubber rimming atop drum.

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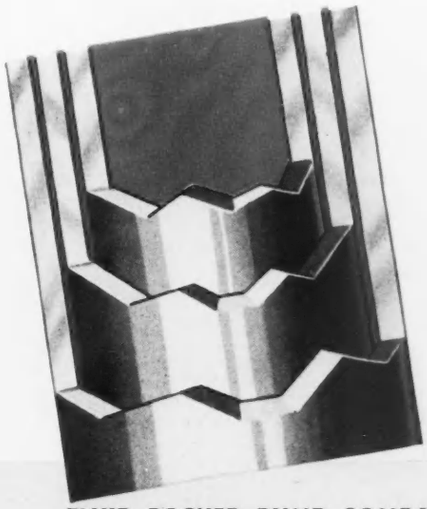

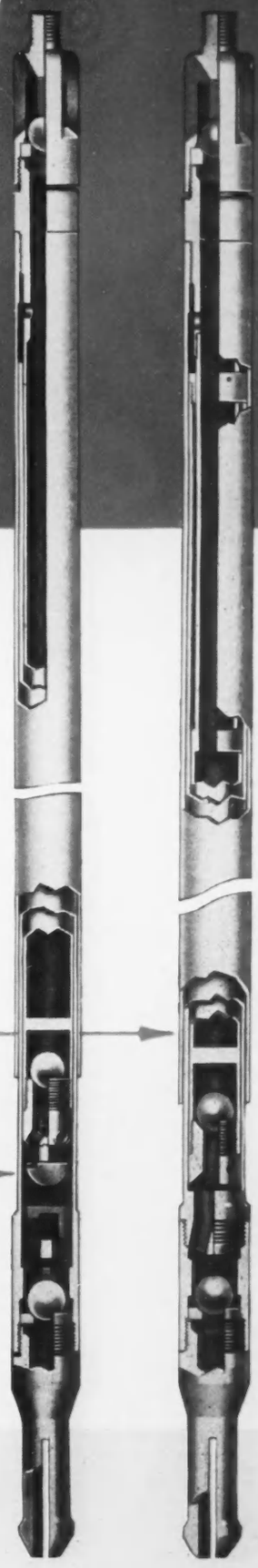

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Illustration at left shows fluid packing in color. It is actually the fluid being pumped.

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View showing perforated bottom shoe on first joint of the special tubing run into the well. Shoe was filled with special grease compound which prevented nitroglycerine from leaving tubing until steel pins in shoe were sheared by hydrostatic pressure of fluid column.

mately 40 feet of water were added to the column immediately above the nitroglycerine, this volume of water having been calculated to be equal to the void space in the marble column. Purpose of the water was to wash out nitroglycerine that might stick to the marbles, then remain as additional tamp at that point when the shot went off.

When operations had reached this point, it was then only a matter of approximately 30 minutes until the charge had been set off. Operations in the order of their occurrence thereafter were as follows:

Atop the approximately 3500 feet of nitroglycerine and short water column placed a wiper mounted integrally with the go-devil or automatic detonating gun. The wiper device consisted of a 26-inch mandrel having several cups on it, some looking downward, others upward. Placed back-to-back, these wipers serve to confine the explosive and prevent mixture with other fluids as well as to wipe down the walls of the tubing as the column moved down the hole. It is estimated that some 100 quarts of the explosive were saved by utilizing the wiping action of the cups in keeping the walls scraped clean.

The automatic gun consisted of a detonating bomb made up of an eight-inch length of ¾-inch pipe secured to the bottom of the wiper unit, the latter also serving to hold the bomb centered in the pipe and hold it in proper position in the column of fluid. The bomb was made up of 1000 grains of TNT which in turn was detonated by a booster charge of 300 grains of fulminate of mercury.

Following the wipers and bomb came an 80-foot column of cleaning fluid. This solution, a mixture of sodium, acetone and alcohol, destroyed any nitroglycerine stains that might have been left on the tubing walls. Removal of these traces of the explosive eliminated any possibility of the detonating wave travelling up into the tubing to destroy part of the string above the actual intended shot area.

Water Tamp Poured

Immediately following the setting of the gun came the final column of water and it was at a certain point during the pouring of the water that the explosion was scheduled to occur. Addition of the water was closely regulated to approximately ½ barrel per minute. When the exact pre-calculated amount of water had been poured into the tubing—a column of some 800 feet above the cleaning fluid—the weight above the shoe became great enough to shear the pins in the shoe, allowing hydrostatic pressure to force open the shoe perforations. The column of fluid, nitroglycerine cleaning fluid and water, then began to move down the tubing in unison, each portion or segment retaining its same relative position as when poured into the tubing. Its rate of descent was at the rate of approximately three feet per second. At the same time the nitroglycerine began to flow out into the well and on into the voids of the limestone formation. As the last of the explosive passed into the column of marbles, the 40-foot column of wash water followed to flow through the voids surrounding the marbles.

At precisely the same time that this water disappeared into the marbles, the wipers and detonating gun came to rest atop the ¾-inch pipe, which, it will be

Lowering the drillable three-inch tubing into the hole. Note portion of clay-filled screen surrounding tubing just visible below elevators. In the center of this special tubing was screwed a pilot tube of ¾-inch pipe. Annular space between this small tube and the tubing was filled with agate marbles.

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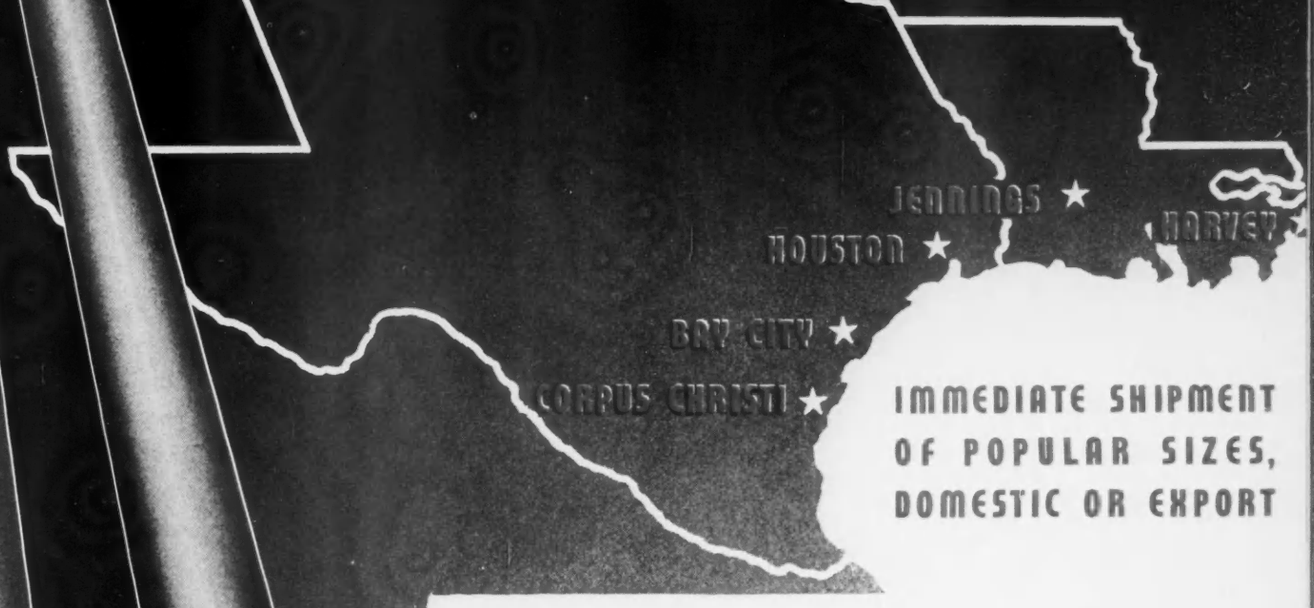

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recalled, was filled with nitroglycerine at the time it was run into the hole. Where heretofore the gun had been travelling down the hole with the moving column, descent of the device now was halted suddenly. With the full weight of the column of water now resting directly upon the gun and cups, a small shear pin in the bomb detonating device gave way. Shearing of this pin released a firing pin which exploded a small shell which detonated the fulminate of mercury and in turn the TNT. This explosion instantly was transmitted to the ¾-inch column of nitroglycerine in the pilot tube, exploding it, which in turn exploded the last of the nitroglycerine disappearing into the hole together with the charge already back in the formation.

Drillable Tubing is Tamp

One of the principal reasons for employing drillable tubing for the bottom 400 feet, aside from the fact that it could be drilled up and removed more easily, is the desirable action of the explosive in forming a strong mechanical tamp or plug at the instant of the explosion. The crushed marbles and fragments of aluminum, together with the clay sheath originally surrounding the tubing, all tend to jam themselves in against the sides of the hole where they block much of the upward travel of the tremendous pressure generated. The confining action of these materials was verified following the blast when it was found that the drillable tubing was sheared off, leaving the hole clear, except for the tamp, below the bottom of the steel tubing.

The entire operation consisting of the perfectly calculated timing as to when certain pins would shear; the pouring and subsequent moving down the hole of the several fluids; and finally the perfect timing of the initial explosion just as the final 28 quarts were disappearing into the bottom of the hole, worked in clock-work fashion, and the successful execution of the experiment is a credit to a small group of engineers who conducted it.

Novel Effects of Explosion

Many interesting and novel effects of the more-than-a-mile-deep record explosion were noted by both witnesses at the well and persons living in nearby communities. Contrary to what many of those near the well had believed, the shock was not felt at all at the derrick; in fact, observers standing a hundred yards from the derrick had to be told that the blast had gone off. The only effect on the well itself was the lifting of the string of tubing when the shot went off. Prior to the final pouring of the water tamp, the tubing was anchored

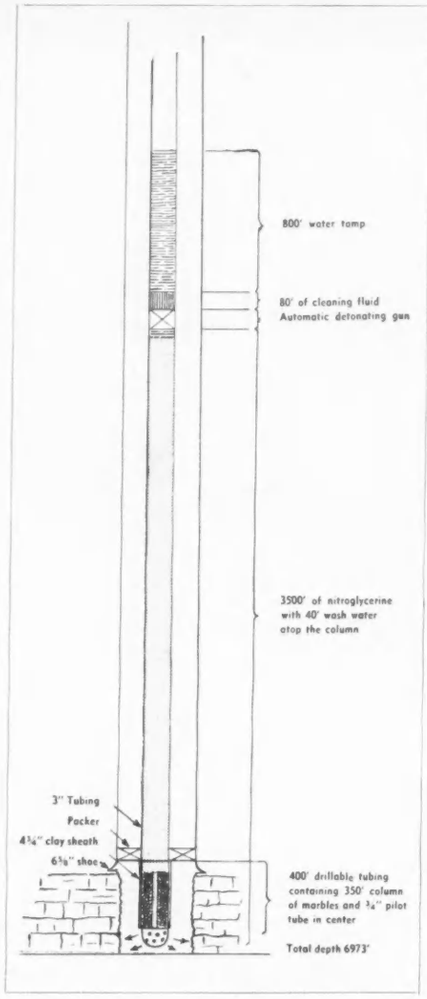

800' water tamp
80' of cleaning fluid
Automatic detonating gun
3500' of nitroglycerine with 40' wash water atop the column
3" Tubing
Packer
4¼" clay sheath
6⅝" shoe
400' drillable tubing containing 350' column of marbles and ¾" pilot tube in center
Total depth 6973'

Chart shows relative positions of nitroglycerine and other materials in tubing just prior to the opening of the perforations in the bottom shoe allowing nitroglycerine to flow out into formation voids. Horizontal scale exaggerated to show more details.

down with steel rods and cable in order to hold to a minimum any possible damage that might be caused by the tubing being kicked out of the hole. When the shot went off, however, these tie rods were snapped like rubber bands and the tubing string jumped some six to eight feet into the air, then fell back to within three to four feet of their original position, at which point the packer slips took hold again. Water in the annular space between tubing and casing also was spilled out on the rig floor—a volume approximately equivalent to the volume displaced by the lifting of the packer.

Shock of the explosion appeared to follow the general northwest-southeast trend of the structure. It was felt 1¼ miles northwest and at least a mile to the southeast. Sharply defining the known faults of the field, the shock wave did not cross the fault line into the gas cap which is cut off to the east, nor did it pass into the fault to the south. An amateur seismograph made by two high school boys recorded the shock a mile south of the well. In a nearby town a man was almost thrown from the barber's chair, yet the shock was not noticed by other townfolk. Light snow covering the ground ¼ mile from the well was seen to lift off the ground and remain suspended for a fraction of a second.

Some idea of the magnitude of the explosion that took place underground becomes more apparent when it is realized how great a problem it was merely to dispose of the 520 "empty" ten-quart copper cans in which the nitroglycerine was carried to the well. Because of the extremely cold weather that persisted throughout the job, some of the explosive—perhaps as much as a tablespoonful per can—stuck to the sides and seams of the containers. Taking about 130 cans at a time, they were gingerly stacked up in a nearby river bed and set off by lighting an extended "fuse" of rags and oil. Touching off only 130 cans at a time made an explosion and mountainous plume of smoke that was reminiscent of photographs shown of the Hiroshima atomic bomb blast, the scene being made all the more spectacular by the explosion of numerous cans in mid-air.

Engineers in charge of the project are optimistic of its success. Tubing already has been pulled and found to be undamaged and cable tools are being rigged to clean out the plug. It is thought that continued jarring or pounding on the plugging material shortly will break it loose, along with the aid of gas pressure that doubtless has developed below the plug due to shutting in of the flow of some 5 million cubic feet of gas per day which was the normal pre-shooting production capacity of the well.

20,000-Quart Shot Next

The inventor and engineer who planned and supervised the operation, Myron S. Zandmer of Los Angeles, believes that if this initial project yields expected results, many more wells that are near the abandoning stage can be shot in this manner, thus materially enlarging known underground reserves. Haskell Greene and K. C. Ball of Hercules Oil Well Shooting Corporation of Los Angeles supervised loading of the explosives, their knowledge of characteristics and proper handling of the materials contributing greatly to the fact that no accident occured to mar the smooth operations of the project.

Should results in this first well prove to be favorable, another well will be similarly shot this summer at which time 20,000 quarts of nitroglycerine will be used.

Alaskan Naval Reserve Pipe Line Prospects

The Yukon River, symbol of everything tough and rugged in the pioneer conquest of early Alaska. A pipe line from Reserve No. 4 would have to cross this stream.

By A. R. McTEE,* Staff Writer

AS PLANS go forward for further exploration on Naval Reserve No. 4 in Alaska, the question of an outlet for the oil, should it be found in commercial or usable quantities, becomes paramount. With the contract for resumption of drilling on Umiat 1 settled and with the certainty of other wildcat tests on the Reserve, the possibility of a pipe line to the district is relevant. In any general conversation about the project at Umiat, among the first questions asked, are: What good will it do to uncover a huge deposit of oil there? Can it ever be moved out? Isn't a pipe line from that country out of the question? If oil is discovered and if it can be transported, will not the high cost of this transportation make the venture altogether unfeasible?

These questions are natural and logical. Practically everything about the far North justifies them. The remoteness, the climate, the terrain, the totally undeveloped and pioneer character of the area, the extreme ruggedness of the mountain ranges separating the Arctic slope from the rest of Alaska, all combine to create doubts in the mind of the average person as to whether a pipe line can be built from the Reserve. On a recent trip to Point Barrow, as we flew over the Brooks and Endicott ranges over which any pipe line built to the Reserve must cross, looking down on the innumerable peaks, the scene was amazing, wonderful, and terrifying.

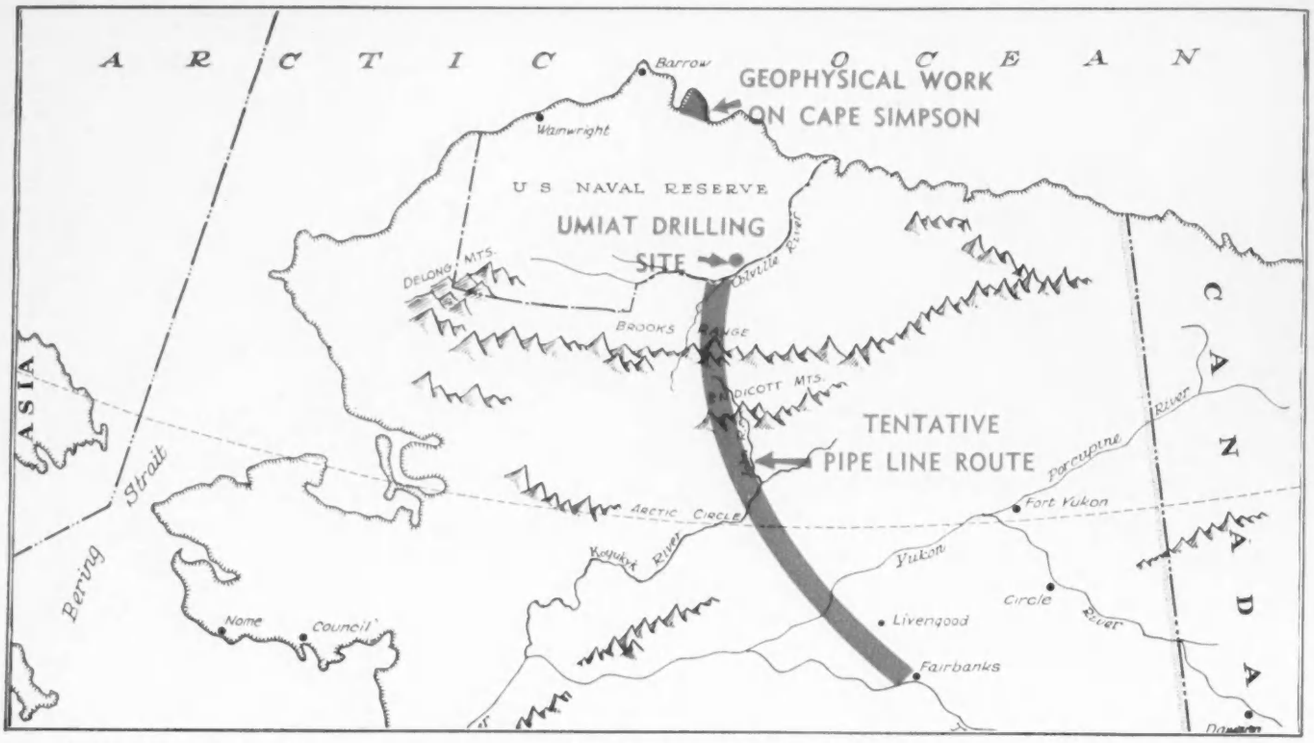
The Navy looks ahead to the day when this far northern land will get a pipe line outlet

Stretching away as far as the eye could see were peaks and craigs of needle and knife-like sharpness, literally rising on top of each other until they seemed almost to touch the plane. Between them the valleys and canyons were half filled with snow and ice, and tremendous glaciers. Everything about the picture impressed one with the incredible desolateness. It was inconceivable from that viewpoint, how a human being could exist on the ground or even find a safe foot-hold, much less plan and execute a gigantic engineering feat such as a pipe line through this ruggedness. From the plane such a thing seemed absolutely beyond contemplation.

Reminds of West Texas

Even after we were over the mountains, crossing the slope toward the Arctic Ocean, the expanse was so vast, so ice-locked, and so limitless, it still seemed that only a visionary or mad man could believe any kind of development possible in such a country. As we

* In November, McTee made an 11,000-mile flight to Point Barrow in order to inspect oil possibilities and current development in Alaska.



A pipe line from Navy Petroleum Reserve 4 is part of the overall planning, but consideration of the line has not gone beyond the bare preliminary stages. Feasibility of the project has been settled by a tentative survey of the route. Further development will depend on results of the exploratory program which may not be finished until 1950.

came down, the appearance changed, however. Nearer the ground, features appeared that reminded one of West Texas. Notwithstanding the fact that ice and snow covered everything, topographic characteristics of the plain were evident. Instead of a perfectly flat, level expanse, the surface actually showed to be quite rough and broken with many creeks, streams, elevations, depressions, and even some small hills. The snow and ice blanket and the streams all frozen so that they looked like meandering ice roads gave an effect through the half light of the Arctic sun that was fantastic, even weird and uncanny. On the ground though, the eerieness disappeared and there was spread out a cold, bleak, hard, snow-and-ice covered, monotonous, slightly broken prairie, stretching away toward the southeast. There was no clearly defined horizon. The white surface just seemed to finally blend into the sky somewhere off in the distance.

Happily, the Navy is not confronted with the necessity for an outlet from the Reserve at this time, and will not be for several years, even if oil is discovered. The exploration program will not be completed before 1950 if things go along in the best manner. Future developments may stretch the time further away before exploration is completed. Then if oil is discovered in quantities to justify a pipe line, the matter will be considered.

As a part of the over-all program for exploring the Reserve, however, the Navy has taken a good look ahead. Contrary to impressions that a flight over the country leaves, people who have had experience on the Reserve say a line is feasible and is considered practicable. As to an actual survey, it can only be stated that it is still very definitely in the preliminary stage. A tentative route from the Reserve to Fairbanks has been settled upon and explored. From Fairbanks to warm water ports on the south coast of Alasak, two alternate routes have been considered, depending upon whether the Alaskan Railroad or the Richardson Highway is followed. Enough engineering and reconnaisance work has been done to satisfy the Navy that such a pipe line is possible and that it will even be economically justified if a sufficient volume of oil is to be transported. This belief is verified by engineers and pilots who helped in exploring the proposed route, and is also shared by geologists who have done field work in Alaska.

Difficulties Not Insurmountable

Philip S. Smith, chief Alaskan geologist, United States Geological Survey, wrote in the AAPG Bulletin, August, 1941, for instance: "It is evident that even the most promising of the prospective oil areas of Alaska have not been tested adequately. The reasons for this are obvious. The districts are all remote from the more settled areas and markets, so that costs are high, transportation facilities meager or lacking, and local supplies of equipment or labor nonexistent. Climatic conditions are adverse. The low temperatures make outdoor operations a real hardship during the winter months; the short open season, which sharply limits certain types of activities, and the long period of winter darkness, combine to present handicaps to development that are not faced in more southern latitudes. Ignorance of the geologic conditions under which the oil occurs and which will be encountered in the search, while in part the same as must be faced in opening any new fields, is perhaps even more serious because of the more than ordinary difficult obstacles to be overcome, and the many new technical problems that lie outside the experience of most oil geologists or operators.

"In spite of these various deterrents to development, the writer feels that in the minds of many persons, the hazards are over-emphasized and do not differ greatly in degree from those faced and overcome in the search for, and development of oil-producing areas in many parts of the world. The bug-bear of Alaska cold is really far less terrifying than the enervation and unhealthfulness of the tropics, with their danger of microscopic and macroscopic animal pests, and the remoteness of some of the areas in Alaska is actually no greater than that of some of the areas in South America and Oceania, which are now contributing their floods of oil."

Since this was written, the Navy has

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The jagged Endicott Mountains through which the line from Umiat to Fairbanks will have to pass. The Anakatuvuk River cuts the mountains through a relatively low pass, and the line will come through this pass.

removed a good many of the difficulties which the author mentions.

The distance from Umiat, the site of the well which will resume operations this summer, to Fairbanks, is approximately 350 miles. Then from Fairbanks down to the port of Anchorage, is 278 miles, and from Anchorage to Seward, directly on the coast, is 114 miles. These are air distances and some variation will be necessary in the actual route a pipe line will take. The proposed route is 500 miles long from Umiat to Fairbanks, though it may be shortened when the work progresses further. From Umiat to the coast on the Gulf of Alaska, will probably involve 800 or 900 miles of line, depending upon which route is chosen from Fairbanks south.

From Fairbanks to the coast, no unusual difficulties would be encountered, since there is a highway already built and also a railroad, and the pipe line could follow either right-of-way. From Fairbanks north to the Reserve, the country is wild and rugged, and 70 miles beyond Fairbanks is the farthermost point where any semblance of road exists. From that point, Livengood, northward, the operation would be through country that has never been traversed except by dog sled, airplane, or by dog sled and canoe, a country that offers formidable barriers at every turn.

From Umiat, southward to Fairbanks, the route that has been tentatively explored and partly surveyed is about as follows: Starting at the well site on the Colville River, in the extreme southeastern part of the Reserve, the line would strike a southeasterly course until it reaches the Anakatuvuk River. It would then follow this stream through the Anakatuvuk pass in the Endicott Mountains, which pass has an elevation of 2250 feet and is the highest point the line would traverse. This side of the pass the line veers slightly to the southwest until it reaches the John River and follows along its course to Bettles, one of the few settlements between Fairbanks and Umiat. Continuing southeastward from Bettles, the route crosses the South Fork of the Koyukuk River, then strikes sharply to the east of south toward the Yukon River and reaches this stream at a narrow gorge, the narrowest point in the Canyon of the Yukon, below Stevens, between the Dull River and the Ray River. This gorge is about 2800 feet wide and a crossing of the Yukon can be made there. This side of the Yukon, the course continues southeastward until it reaches Hess Creek, then follows eastward along the creek for a short distance, then turns southeastward again to Livengood, and from that point follows the approximate route of the highway into Fairbanks.

Access Road a Problem

The preliminary survey began in December, 1944, and was finished in May, 1945. The Navy directed the work and was assisted by bush pilots, the Northern Air Service and dog teams of the Alaskan Scouts, United States Army. The various parties worked along different sections of the route at the same time, and were kept in supplies and communications with each other by air transport with Alaskan bush pilots flying the planes. Planes landed on the ice along the route and without them, the survey could never have been completed within the time that it was, or with the thoroughness.

The building of an access road actually presents the greatest, but not insurmountable problem. Elevations, river crossings, terrain, etc., do not appear too foreboding, and by the time exploration of the Reserve is completed, if results call for a pipe line, the difficulties will have been more fully studied and their solution easier.

The pipe line would probably have to handle from 50,000 to 100,000 barrels of crude daily for a number of years to justify its construction and the installation of associated facilities. On this basis the Navy has estimated that a proved reserve of at least 500,000,000 barrels would be required to support the necessary investment. No figures on the cost of such a line are available, and it is doubtful if even an estimate has been made, but $95,000,000 might not be too high.

The line would probably have to be laid on top of the ground, since the terrain in many places would preclude any excavation. Stream crossings would probably be by bridges, since the line would have to be accessible at all times. Snow would present a problem, but engineering will have to master this since the line would cross a part of Alaska where the snowfall is excessive throughout the winter months.

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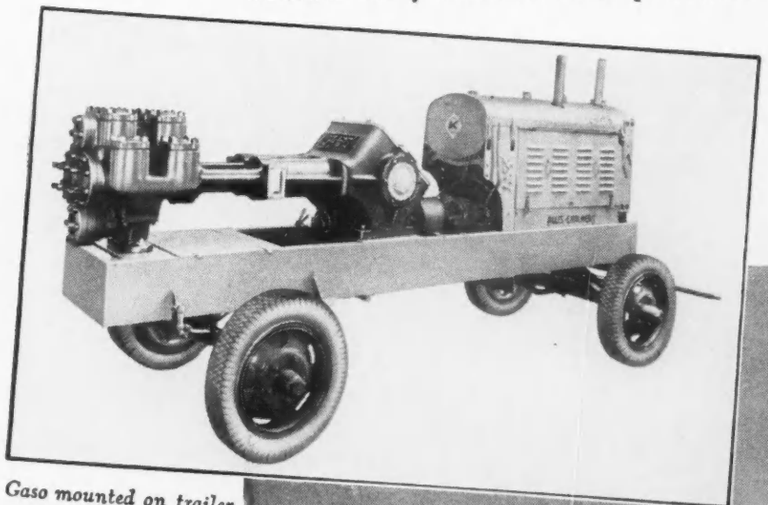

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Norman Wells Oil Field

Region's Possible Oil-Bearing Area Will Require Many Wells to Test it Adequately

By DR. J. S. STEWART, Geological Survey of Canada

THE Norman Wells oil field is on the Mackenzie River about 85 to 90 miles south of the Arctic Circle and about 55 miles from Fort Norman at the mouth of Great Bear River.

Access to this region before the advent of the airplane was by boat, mainly by way of Athabaska and Slave Rivers to Great Slave Lake, and thence down the Mackenzie River. This is the route still taken by all heavy freight.

Length of this water route is about 1660 miles from the end of the railway at Fort McMurray to Aklavik in the delta of the Mackenzie River. All mail and practically all passenger service for workers and officials are furnished by airplane.

The Norman Wells air field is about a mile from the oil field and is the northern terminus for planes equipped with wheels. Beyond Norman Wells to the north, plane service is performed by pontoon or ski-equipped planes.

The season for water transport is, however, very short, about four months, because the ice remains on Great Slave Lake long after the rivers are clear in the early summer.

At Norman Wells the river flows in a westward direction and the camp is on the north bank. The valley here is about 25 miles wide, is poorly drained, and contains much muskeg and many small lakes. The permanent frost extends from 100 to 200 feet beneath the surface and in the muskeg or swampy area, the thaw extends only one or two feet beneath the moss covering.

The bituminous nature of the rocks along Mackenzie River and the occurrence of oil seepages had been noted by early explorers and were described in the first report on that region for the Geological Survey of Canada by R. G. McConnell.

EARLY in 1943, the writer was assigned to act as liaison officer between the Department of Mines and Resources and the United States Army on the Canol Project, and as supervisory engineer for the department on the same project and since its termination in May, 1945.

The writer wishes to express appreciation of the generous assistance and courtesy of United States Army officers and officials of Imperial Oil, Ltd.

The first well in the Norman Wells field was drilled in 1920. In 1942, when the Canol Project started, there were four producing wells. These supplied ample crude for processing at a small local refinery to meet the demand for motor fuel of the entire Mackenzie River region.

The Canol Project

In 1942 the Japanese carried the war to Alaska and threatened to interrupt tanker shipments of vital petroleum products from Pacific Coast ports in the United States. This caused United States military authorities to seek a source of motor fuel closer to the combat zone and resulted in the Canol project. The Norman Wells oil field was the foundation on which the Canol Project was built. The project was the result of an agreement between the governments of the United States and Canada and between the United States and Imperial Oil Ltd. The participation of Imperial Oil was necessary because its leases and oil wells were involved.

The project had for its object the drilling and development of the oil field and exploration and wildcatting in other areas outside the proven field; the building of a pipe line southwest from

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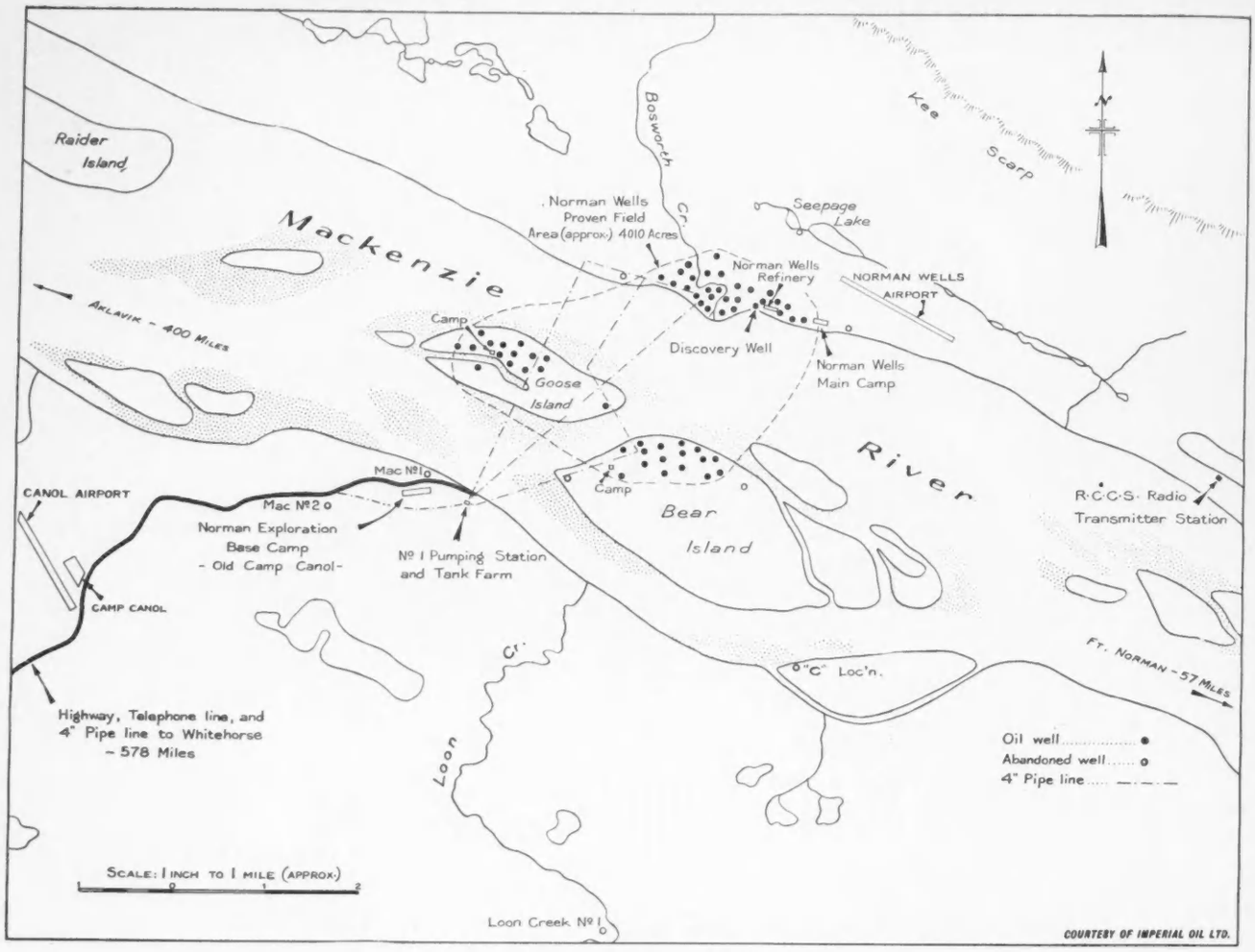

Map of Norman Wells and Vicinity

Mackenzie River to Whitehorse, a distance of about 600 miles across an unsettled mountainous region; and the construction of a refinery at Whitehorse, Yukon.

The United States furnished the capital, and the U. S. Army supervised the work. The Canadian government facilitated the work by providing or helping to acquire sites for buildings, rights of way, timber, etc., and by waiving taxes, royalties, and custom duties.

Imperial Oil placed its leases, oil wells, refinery, equipment and technical staff at the disposal of the project and agreed to drill or supervise drilling and oil production.

Canol Work Starts

Work on the Canol Project started in May, 1942, and the order to stop drilling and production was given March 8, 1945. On May 3, 1945, the contract agreement with Imperial Oil was officially terminated.

Under the first agreement the United States paid a certain fixed price per barrel for the oil, all of which in the early stages was produced on leases of Imperial Oil. Later, when the field and production had spread to areas outside of these leases, the agreement was changed and the U. S. paid cost plus 20 cents per barrels for all oil delivered. The Canadian government created an oil reserve consisting of all the land within a radius of 50 miles of the discovery well.

The first objective of the drilling campaign was to obtain sufficient production to guarantee delivery of 3000 barrels per day in excess of local requierements. The success that attended early efforts to extend the field caused U. S. authorities to raise the production objective to 20,000 barrels per day and to engage in a wildcat drilling program and extensive geological exploration. In accordance with these wishes, the government of Canada rescinded all previous regulations governing petroleum and natural gas rights and virtually created a reserve of the whole of Yukon Territory; also all that part of the mainland of the Northwest territories west of the Mackenzie River plus a strip for 75 miles east of the Mackenzie River from the Beaufort Sea to Fort Providence, and in addition that part west of a line drawn due south from Fort Providence to the north boundary of the province of Alberta.

After drilling four wildcats without favorable results, the United States withdrew from the wildcat drilling and exploratory program and confined its drilling efforts to the proven Norman Wells field.

When the contract was terminated, 64 productive wells had been drilled in the field, four of these were drilled before the time of the Canol Project.

Company Agreement

As stated by the then Minister of Mines and Resources in the House of Commons Debates, Friday, May 5, 1944:—

"The agreement with the company will fix the share of the Dominion in the proven field at ⅓. The field shall be developed by the company as a unit operation, the company to furnish all the funds necessary therefor and the government to pay its ⅓ share of the actual direct cost of producing the oil, plus a management fee of 10 percent. In addition to receiving a ⅓ share of the oil, the government is entitled to a royalty

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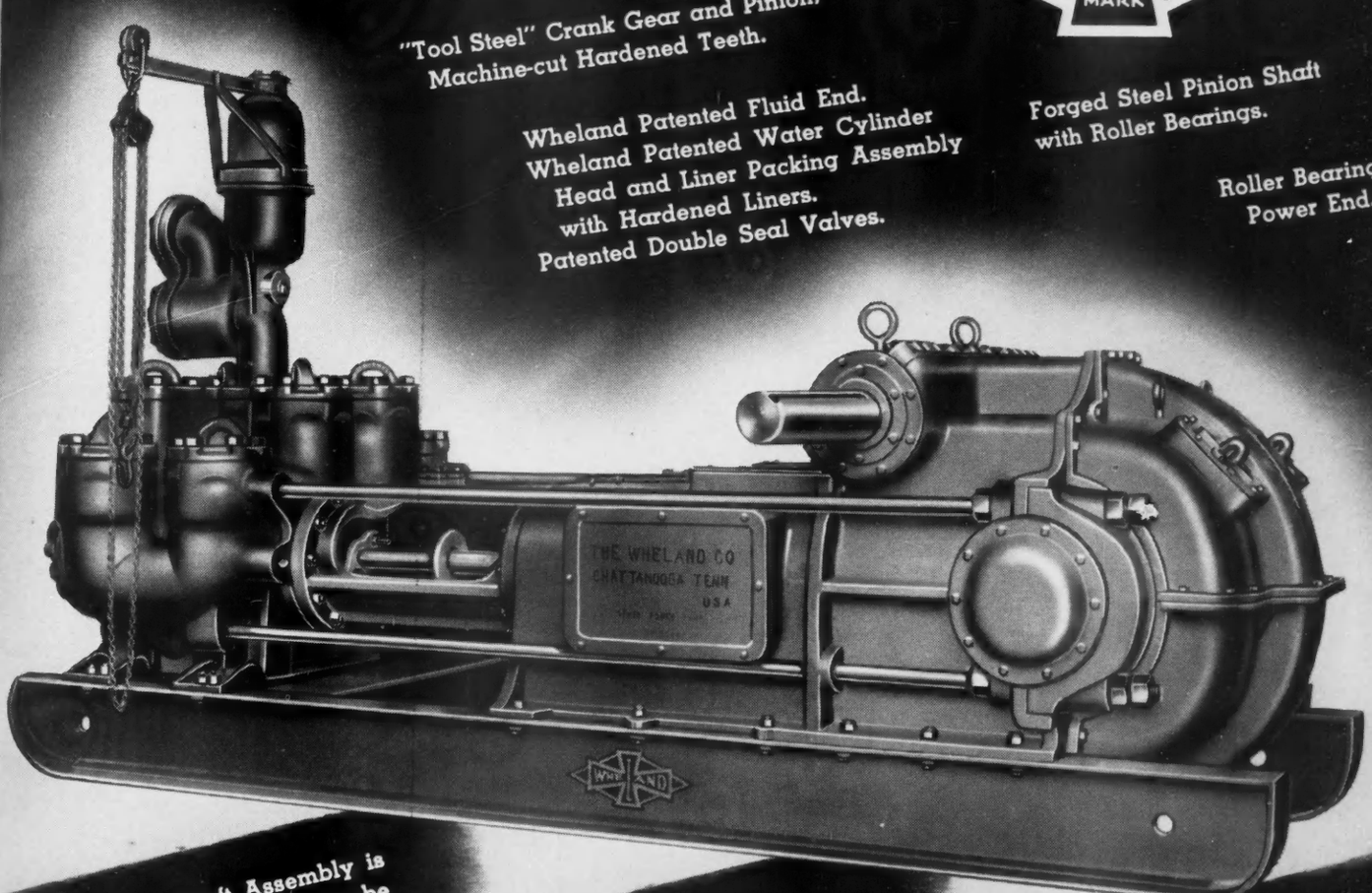

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of 10 percent on the ⅓ share included in the old leases. For accounting purposes it was decided to make the royalty applicable to the company's 2/3 share and the rate therefor was fixed at 5 percent.

"The government also has agreed that the company may give an option to the United States government to purchase for its own use but not for resale at cost plus 20 cents a barrel, an amount up to ½ of the oil recovered from the proven area, not exceeding 30 million barrels, and that, in making up this ½ the company may draw upon the government's share to the extent of ⅓. The option is to be subject to the prior and preferred supplying of all the local requirements for oil and oil products. It should be mentioned that under the option the United States government will be required to take its oil currently as the field is produced, at the rate of 20 percent of the total amount currently produced from the proven area for export.

"The option is also subject to the condition that if the United States government does not desire to take its share currently, then the company shall be entitled to sell such oil on its own account, in which case the United States government would be entitle to any difference between the cost of production, plus 20 cents per barrel, and the average sale price received by the company for oil sold by it during the period in question.

"The government has also agreed that the company may include in the option to the United States government the right to purchase 10 percent of any oil that may be found in the remainder of the permit area or in any other areas that may be taken up by the company under the new regulations, until a total of 60 million barrels is reached, including that to be obtained from the proven field. The same conditions as stated above will apply to the United States government taking the oil at the rate of 20 percent of the total amount currently produced. The total option, therefore, is limited in time; that is, it will expire approximately 20 years after a commercial pipe line has been constructed.

"In respect to the new regulations to be established, the order in council sets out briefly some of the more important conditions that will be imposed. It is to the general advantage of Canada that an active program of exploration and search for oil should be carried out in order that new sources may be found and developed. The regulations will make available to all companies and individulas the opportunity of exploring and developing these resources."

History of Development

A brief history of the development prior to the start of the Canol Project in 1942 is perhaps necessary to provide a clear background.

The discovery of oil in Turner Valley near Calgary, Alberta, in 1914 started an oil boom in northwestern Canada and in that year a small syndicate engaged Dr. T. O. Bosworth to investigate the petroleum possibilities of Mackenzie River Valley in the vicinity of Fort Norman. Bosworth staked three claims along the river near some oil seeps at the mouth of a creek now known as Bosworth Creek. Later these claims were acquired by the Northwest Company, a subsidiary of Imperial Oil Ltd.

Discovery Drilled

In 1919 drilling equipment was shipped to the claims, the site for a well chosen and a rig erected. The site for this first well was selected by Dr. T. A. Link for the Northwest Company. In 1920 Discovery Well 1 was drilled to 783 feet where a flow of oil was encountered. Oil began seeping into the hole at a depth of 85 feet and practically all the strata encountered (mainly shales) appeared to be oil saturated. When the first flow subsided, the well was capped and operations were suspended for that year.

In 1921 storage tanks were erected and the well produced at the rate of about ten barrels per day by natural flow. In 1922 the well was deepened to 991 feet and increased production re-

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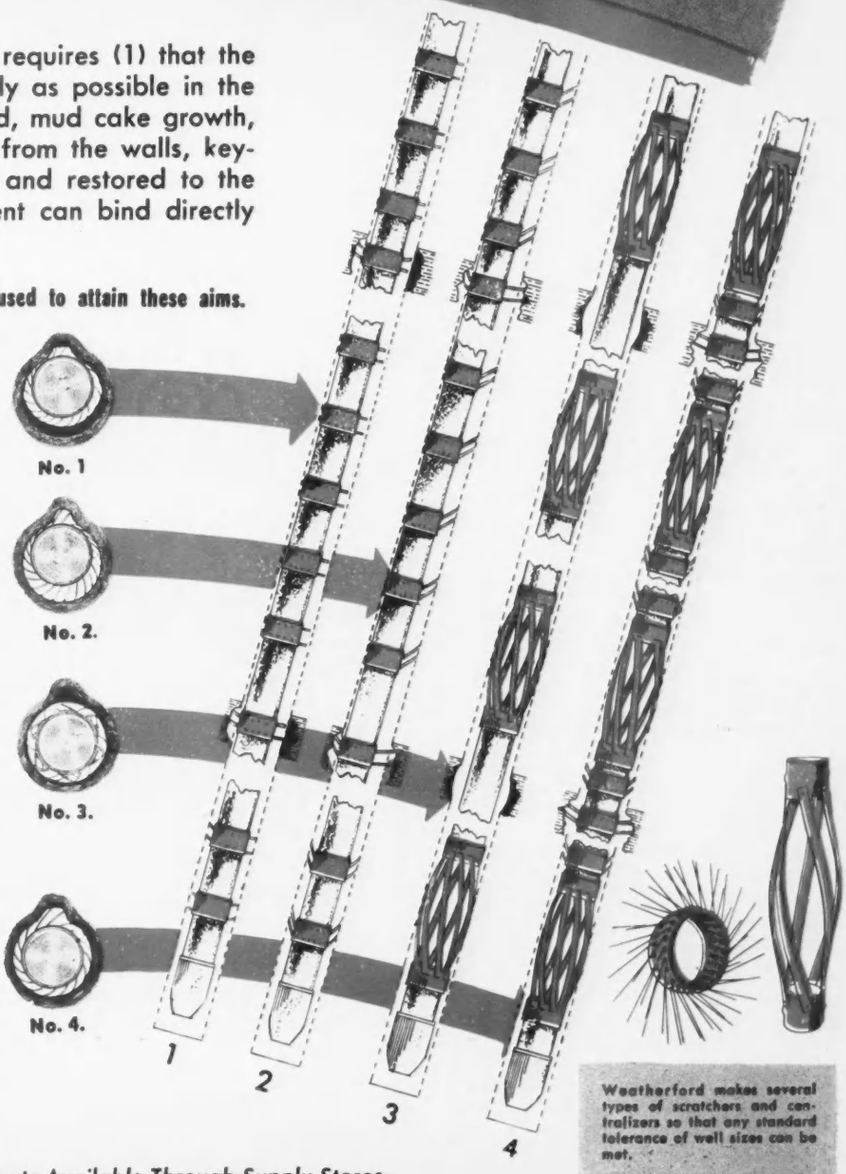

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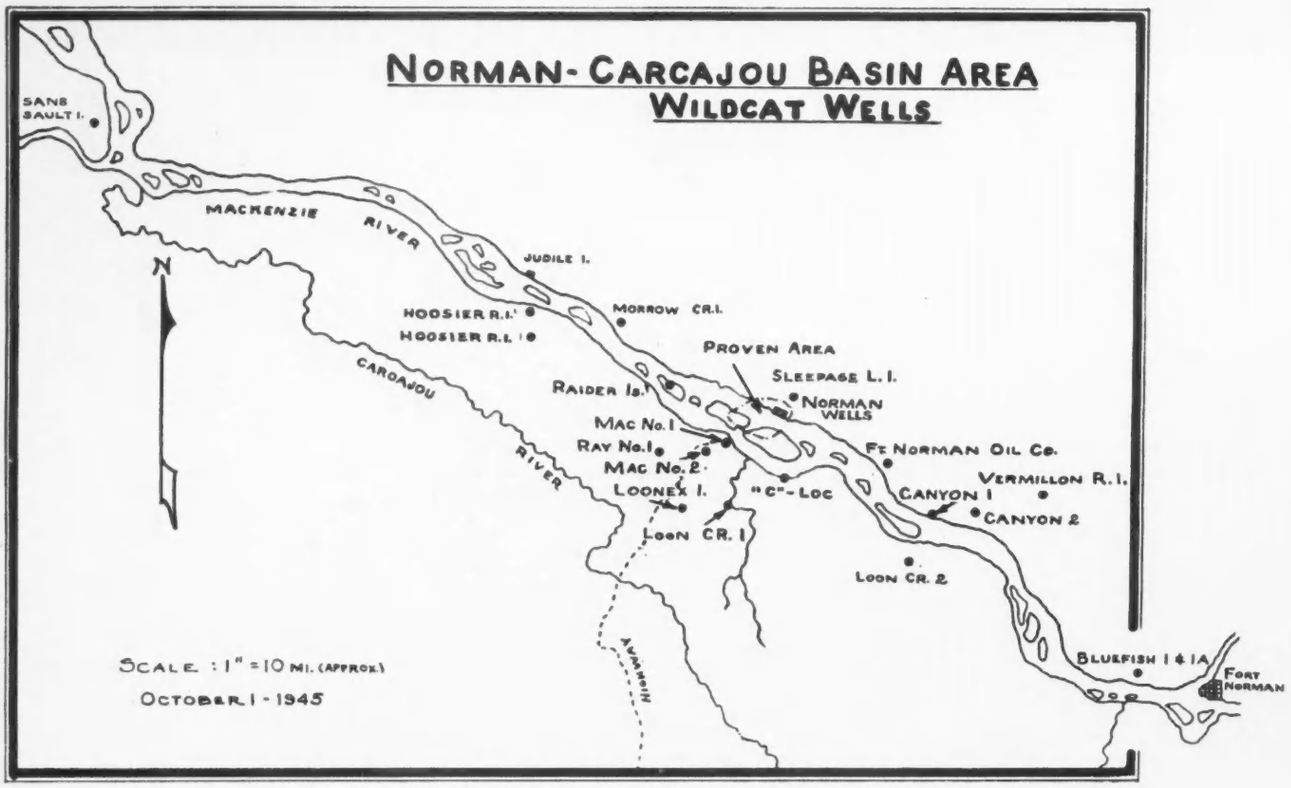

sulted. Subsequently is was deepened to 1025 feet and its daily capacity was estimated at 75 to 125 barrels per day.

Well 2 is only 150 feet from 1. It was started in 1924 and completed in 1925. Although a flow of oil was struck at 1060 feet the hole was drilled to 1602 feet. At 1060 feet oil shot 30 feet above the derrick and flowed intermittently. The flow increased with deeper drilling and its capacity was estimated at 175 to 240 barrels per day.

Bear Island Test

During this same period the Northwest Company (Imperial Oil) carried on some wildcat drilling farther afield. A well was started on the western tip of Bear Island about three miles from the Discovery 1 well. Drilling commenced on this Bear Island 1 well in 1921 and some oil showings were encountered between 1948 and 2000 feet. Deeper drilling encountered salt water and the well was completed in 1924 at a depth of 2304 feet. It was abandoned, but was not plugged, and in 1943 it was reopened and found to contain considerable oil. This well is now known to be on the edge of the field, is not considered commercial and no attempt has been made to obtain oil production from it.

C-camp Well 1 is on the south bank of Mackenzie River about four miles southeast of Discovery 1 well. Mechanical trouble developed at 1704 feet and the hole was abandoned. The derrick was skidded 40 feet and this second hole was drilled to 3057 feet. No oil was encountered and the test was abandoned.

A well was started at Bluefish Creek in 1921. This location is on the northeast bank of the river about 10 miles downstream from Fort Norman. At 495 feet the tools were lost in the hole. Attempts to recover them were unsuccessful and the test was abandoned.

In 1921 the Fort Norman Oil Company drilled a well about eight miles upstream from the Discovery 1 well. Gas was reported at shallow depth but no oil in appreciable amount was encountered and the well as abandoned at 1512 feet.

Mining development on Great Bear and Great Slave lakes created an increased demand for petroleum products and in 1939, to meet this demand, wells No. 3 and 4 were started, and a new refinery unit was installed at Norman Wells. Well 3 was drilled to 1830 feet in 1939. A small amount of oil was encountered at 1100 feet, but was not considered commercial. In 1940 this test was drilled to 2702 feet without change in its productive capacity. With later reconditioning this well made about 15 to 30 barrels per day.

Well 4 was commenced and completed in 1940 at a total depth of 1215 feet. The top of the productive horizon was penetrated at 1092 feet but was most productive at 1150 feet. The rated capacity of this well was 100 to 140 barrels per day.

The small refinery still, installed at Norman Wells in 1921, was replaced by a larger refinery unit in 1939. This unit had at first a capacity of 840 barrels per day, but later improvements increased the refinery daily capacity to 1200 barrels.

This was the situation in 1942 when the Canol Project entered the field.

Stratigraphy and Structure

The isolated nature of the region, the difficulty of travel and short field season have made geological work slow and information hard to obtain. Consequently, the earlier reports based on hurried reconnaissance surveys usually need revision when the region is investigated in more detail and new areas are explored. Much of the information concerning the geology is derived from reports of the geological staff for the Canol Project.

Table 1 gives a general idea of the sequence and character of the various stratigraphic units and the present tentative grouping by the Geological Survey of Canada.

Table 1 deals with the sequence of strata that outcrop in Mackenzie River Valley between Fort Norman at the south and Fort Good Hope at the north, a distance of about 170 miles by the river. Within that distance the lateral variation of each formation both as to character and thickness is considerable. In general, the thicknesses given are the maxima that could be measured with any degree of accuracy.

The tertiary beds lie unconformably on the Cretaceous and occur in isolated patches.

The Cretaceous strata rest discon-

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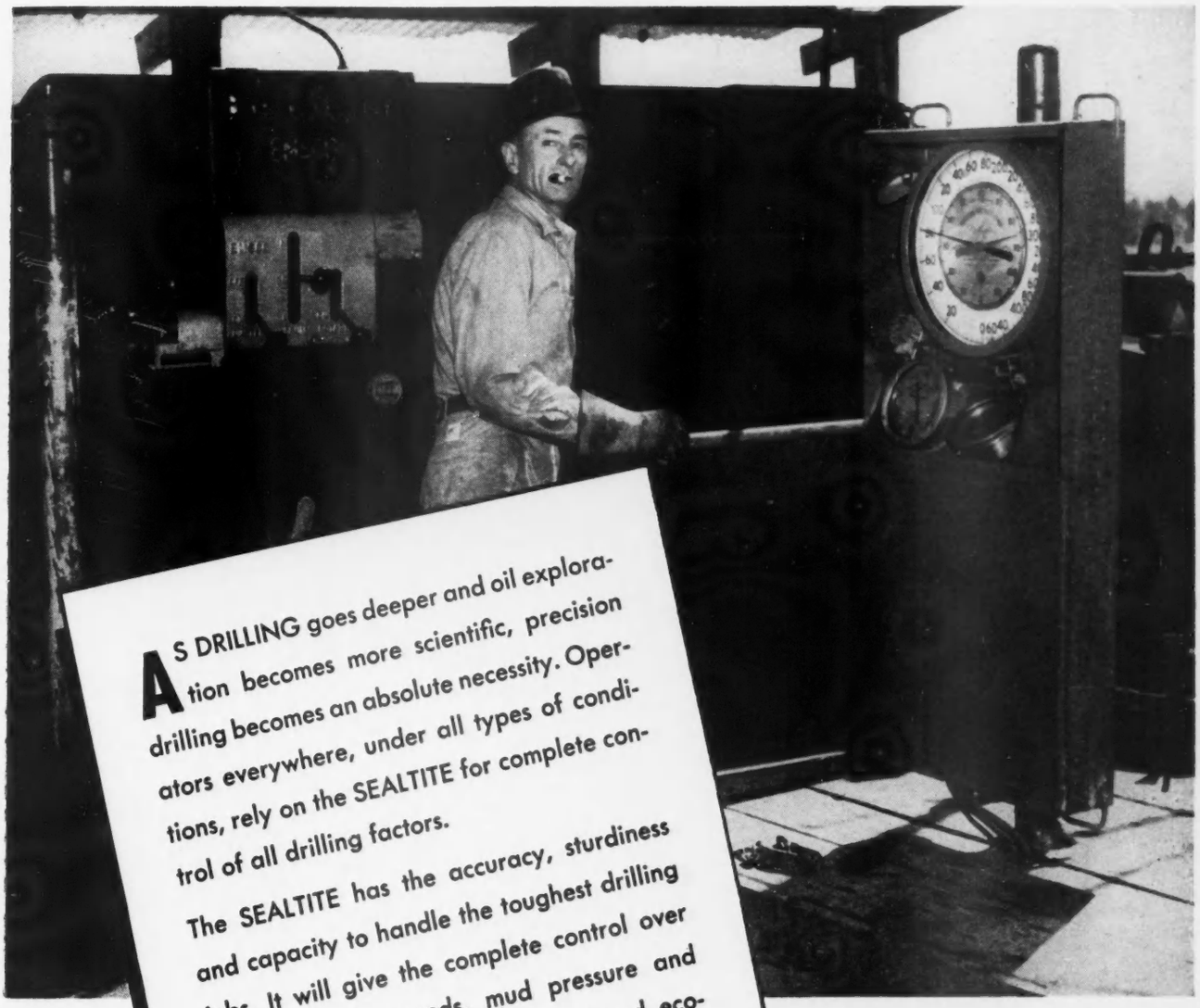

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TABLE 1

Sequence and Character of Mackenzie River Valley Formations

AGE	Formation or Group	Description	Thickness in Feet
Recent and Pleistocene	Undifferentiated	Unconsolidated sands, gravels, clays, etc.	Extremely variable
Tertiary	Undifferentiated	Conglomerate sandstone, shale and lignite.	1200
Upper Cretaceous	East Fork Formation.	Grey marine shale with a little sandstone.	850
	Little Bear Formation.	Conglomerate sandstone, shale and lignite.	700
	Slater River Formation.	Black fissile shale with ironstone concretions, also thin bands of bentonite, marine.	1000
Lower Cretaceous	Sans Sault Group.	Grey shales and sandstone, marine.	3800
Upper Devonian	Imperial Formation.	Mainly sandstone and shale with a little limestone, marine.	1200
	Fort Creek Formation.	Upper shale member, contains local sandstone and limestone.	700
		Bituminous shale member.	100 to 400
		Reef limestone member.	Up to 450
		Lower shale member, marine.	540
Middle Devonian	Ramparts Formation.	Beavertail buff limestone upper member. Ramparts limestone and shale middle member. Hare Indian River greenish shale, lower member, marine.	2000
Devonian or Silurian.	Bear Rock Formation.	Dolomite limestone with some gypsum characterized by a coarse breccia of large angular blocks of dolomite.	400
Silurian	Ronning Group.	Hard dense cherty dolomite.	1500
Cambrian	Macdougal Group.	Upper member is reddish shale and limestone with salt and gypsum. Lower member shale, sandstone, limestone and gypsum.	3450
	Katherine Group.	Sandstone and quartzite pink to white in color, also shales, black greenish, maroon to red in color.	450

formably on an eroded surface of Devonian rocks and occupy a large part of the main river valleys in the Lower Mackenzie River basin.

The Devonian rock outcrops are numerous in the vicinity of Mackenzie River, are commonly bituminous and apparently the source of the petroleum.

Silurian rocks outcrop only in the Franklin Mountains about five miles northeast and in Mackenzie Mountains 20 to 25 miles southwest.

No strata of Ordovician age have been recognized in the Norman-Good Hope region.

Cambrian rocks like the Silurian outcrop only in the mountains. The salt and associated shales placed in the upper part of the Macdougal Group and included in the Cambrian may be later in age. This thick salt series has been correlated with salty beds that occur some distance southeast which were placed in the Middle Cambrian but the proof of age is questionable.

Some of the beds in the Katherine group may be Precambrian in age. The Cambrian age is assigned to this group on the basis of their stratigraphic position immediately underlying beds containing Middle Cambrian fossils, and the absence of any recognized unconformity.

The strata in this region have been folded and in places faulted. The general trend of the structure is northwest-southeast, but there are notable variations from this general direction. The structure is also characterized by wide belts of gently dipping beds with dips of ten degrees or less, and narrow belts of beds with steep to vertical dips. In some cases these steep limbs appear to be faulted, but the stratigraphic displacement is generally small.

The Norman Wells Oil field is on the southwest flank of a major anticlinal uplift where the strata dip at an angle of four to five degrees southwestward.

Description of the Field

In the vicinity of Norman Wells the strata consist of shale and limestone with a lesser amount of sandstone, and are largely of Devonian age. In the southern margin of the field the Devonian sediments are overlain by Cretaceous shales. The oil occurs in a reef limestone member of the Fort Creek formation. This reef limestone is overlain and underlain by shales and varies considerably in thickness even within the small area that constitutes the proven field. Top of the reef limestone is encountered in the shallower wells in the northern part of the field at 1050 to 1150 feet. In the deeper wells on Bear Island and Goose Island the top of the limestone is at a depth of 1600 to 1900 feet. Table 2 shows typical condensed logs of wells in northern and southern parts, respectively, of the field.

The logs are compiled from examination of drill samples and cores, supplemented by electrologs. The reef limestone is the oil reservoir, and in general the upper part of the reef shows the greatest degree of oil saturation and the lower part is barren. The wells before 1942 and the Canol development were drilled by standard tools, but under the Canol Project standard tools drilled only two wells. The others were all drilled by rotary rigs.

Canol Project Development

Work on Canol Project drilling started early in the summer of 1942. In that year 16 wells were drilled, two of which failed to produce oil in commercial quantity. On March 8, 1945, when drilling for the Canol Project ended, 67 Project wells had been drilled, 60 found oil in commercial quantity and seven were classed as dry holes. Four of the dry holes were wildcat tests located some distance from the productive area. The other three dry

TABLE 2

Typical Condensed Logs of Norman Wells Field

North bank of river log of well 18X. Total depth 1522 feet, elevation 329 feet

Age and Formation	Description	Depth in Feet
Pleistocene and Recent	Sand, gravel, etc.	0 to 70
Devonian:		
Imperial	Greenish sandstone and shale	70 to 195
Fort Creek	Upper gray shale member	195 to 955
Fort Creek	Bituminous shale member	955 to 1120
Fort Creek	Reef limestone member	1120 to 1485
Fort Creek	Lower gray shale member	1485 to 1522

Log of Bear Island 2 well in south part of field. Total depth, 2035 feet, elevation 304 feet

Age and Formation	Description	Depth in Feet
Pleistocene and Recent	Sand, gravel, etc.	0 to 270
Cretaceous	Chiefly dark gray shale	270 to 340
Devonian:		
Imperial	Greenish sandstone and shale	340 to 860
Fort Creek	Upper gray shale member	860 to 1595
Fort Creek	Bituminous shale member	1595 to 1706
Fort Creek	Reef limestone member	1706 to 2035

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holes were drilled just outside the proven area and so helped to delineate the oil field.

The wells drilled to date outline an area of more than 4000 acres that will probably prove productive. Much of this area is covered by the Mackenzie River and the ultimate recovery of oil from the field will depend largely on the degree of success that attends efforts to drain the part beneath the river.

Productive Area

Latest estimates of the area covered by the productive section of the reef give 4010 acres, of which 1870 acres underlie the Mackenzie River. The true reef with saturated sections varying from 0 to 388 feet reaches a maximum thickness of about 400 feet and is a local development. This true reef has grown on a barren basal limestone about 100 feet thick and extends over a wide area beyond the limits of the productive oil field. As already noted, the structure is monoclinal and the dip of the beds gentle. Closure on the saturated section is formed by a pinching out of the reef up dip. Oil saturation of the true reef is irregular, both horizontally and vertically.

In the early stages of development of the field under the Canol Project estimates of recoverable reserves were of necessity calculated by the porosity area method. Based considerably on assumptions, these estimates varied from 30 to 63 million barrels. A complete bottom hole pressure survey of the pool was commenced immediately after the Canol Project was halted. With the additional data available, W. D. C. Mackenzie, petroleum engineer for Imperial Oil Ltd., estimated recoverable oil reserves at 36,250,000 barrels from a drainable area of 2600 acres. This includes about 460 acres beneath the Mackenzie River that can be drained by directional drilling, and gives an average of nearly 14,000 barrels per acre. It leaves about 1410 acres of potentially proven territory lying beneath Mackenzie River that are considered at present not economically drainable.

Spacing, Drilling and Completion of Wells

On the north bank of the river, which was the first part of the field to be developed, the spacing of wells is about every ten acres. On Goose Island and Bear Island, spacing is on a 20-acre basis.

In the 67 Project wells, 129,429 feet of hole were drilled. Drill pipe used was 4½-inch, with rock bits drilling a 13¾-inch hole for 10¾-inch surface pipe. This was followed by 9⅞-inch hole for seven-inch production casing. The earlier wells used five-inch production casing. The surface pipe in the great majority of the wells is set at 250 to 300 feet. Numerous core samples were taken and core recoveries were good above the reef limestone, being 80 to 100 percent. The recoveries were also good in the barren section of the limestone, but were consistently poor in the porous horizons.

The oil reservoir is a high calcium limestone, very susceptible to the action of hydrochloric acid. When the true nature of the reservoir was understood, the final casing program was based on pressure maintenance, and as protection against future gas channeling. To accomplish this the production casing was run close to the bottom of the productive horizon, cementing solid and gun perforating opposite the main porous sections of the reef.

Acid Treatment

The relatively high reservoir pressures at comparatively shallow depth made it possible to blow the wells clean by natural flow before treating with acid. Best results were obtained by the application of a 300-gallon, 15 percent acid wash, followed by a penetration treatment of 1000 to 2000 gallons. Experiments using greater quantities of acid in the penetration treatment yielded no marked benefits. When the penetration ratio exceeded 100 barrels per hour (pump pressure 500 pounds per square inch), no further benefits were observed. Careful tests showed that the acid was 95 percent spent when it had been in contact with the corraline limestone reservoir for 20 minutes. The wells were consequently allowed to clear themselves by blowing to a flare shortly after the last of the acid had reached bottom. This early blowing of the well after acid treatment caused emulsions to break and clear easily. In general it was found that acid treatment doubled the initial flow.

Reservoir Data

The original reservoir pressure was 695 pounds per square inch at 1000 feet sub-sea. This pressure varied from a datum plane throughout the reservoir on a uniform hydraulic gradient of 34.3 pounds per square inch per 100 feet. The discovery area on the north bank of the river and on Bear Island were produced by gas in solution drive. On Goose Island there is some evidence of a water drive. The information of water drive, however, is incomplete and it is not yet possible to draw definit econclusions.

On March 8, a total of 1,997,000 barrels of oil had been produced from the field. During this production period the weighted production pressure, for Bear Island and north bank of the river, declined 40 pounds per square inch.

The bottom hole temperature is 61° F. at 700 feet sub-sea (surface elevation 300 feet). This temperature increases with depth at the rate of 0.0258° F. per foot.

The specific gravity of Norman Wells crude varied from 39 to 41.5-gravity. It is a paraffin base oil with a pour point of minus 70° F.

Experiments on pressure volume relations show the following:

(1) The crude as it occurs in the reservoir is undersaturated with gas.

(2) The bubble point of the crude is 490 pounds per square inch at reservoir temperature.

(3) The original gas in solution of the reservoir oil is 325 cubic feet per barrel of reservoir fluid.

(4) The shrinkage factor from reservoir fluid to stock tank oil is 17.2 percent.

In addition, it had been determined previously that there was no original free gas cap in the Norman Wells pool.

Gas-oil ratios averaged 725 cubic feet per barrel in February, 1945, with an average daily production of 4288 barrels. All wells produce by natural flow. The field is relatively shallow and so wellhead pressures are moderate. Casinghead pressures as high as 750 pounds per square inch were recorded but were unusual.

Flow rate of wells is controlled by removable bean at the production battery and in most cases the bean size is 5/32-inch.

To counteract the rigorous winter climate at Norman Wells, where a temperature of 30° below zero Fahrenheit. is not unusual for a period of several weeks and even lower temperatures not uncommon, separators and manifolds are completely housed.

Paraffin and gas hydrate accumulated in flow lines during the winter of 1942-43. This clogging of flow lines was overcome by maintaining back pressure in the lines, by steam tracer lines (used intermittently), and by go-devils. Practical limits of steam tracer lines have been found to be 2000 feet with good quality insulation. Longer lines were successfully operated with go-devils.

Pressure Maintenance

In the first year of Canol Project development, it was realized that pressure maintenance would increase total recoverable oil, but the gentle dip and low permeability of the reservoir limestone did not tend to make conditions ideal. However, it was decided that increased total recovery would justify a pressure maintenance program. A compressor plant was built for the purpose on the north bank of Mackenzie River,

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and a well (18X) was chosen to act as the avenue of injection. This well had already gone largely to gas and was near the high point on the structure outlined by the top of the reef.

The plant was in operation about five months. During that time some 177,639 Mcf of repressured gas was returned to the reservoir, equivalent to 602,000 barrels of reservoir space. Well head injection pressure increased somewhat at first but was on a declining trend at 695 pounds per square inch when operations ceased. There was some evidence of gas channeling in nearby wells.

Oil Production

Oil production of wells is strictly controlled in order to keep down gas-oil ratios. The capacity of adjacent wells is, however, so different in some cases that it suggests fractures in the reservoir along certain lines and low permeability in general. The most productive well produced nearly 150,000 barrels in the first two years of its life. The estimated efficient potential daily capacity of most of the wells was less than 100 barrels per day, but the majority were producing between 100 and 200 barrels daily.

Prior to the inception of the Canol Project in 1942, oil production of the Norman Wells field was small, in keeping with the limited local demand.

The cumulative production of the field up to the beginning of 1942 was 118,895 barrels. As a result of the project development production increased rapidly as follows:

YEAR	Oil Production in Barrels
Prior to 1942	118,895
1942	82,324
1943	266,882
1944	1,229,310
1945, Jan. 1 to March 8	279,931
1945, March 8 to April 1	11,106
1945, April	2,048
1945, May	8,053
1945, June	8,661

The big increase in production in 1944 was due to the fact that the pipe line outlet and the refinery at Whitehorse were completed and began operating April 30, 1944. On March 8, drilling and oil production for the Canol Project was stopped. Until March 8, 1945, the cumulative production of the Norman Wells field was 1,977,342 barrels, and at the end of the six-month period, July 1, 1945, the cumulative production of the field had exceeded 2 million barrels.

Norman Wells Refinery

Norman Wells refinery as presently constituted has a total throughput capacity of 1200 barrels per day and during the project was processing 87 and 91-octane aviation gasoline, 74-octane motor gasoline, light and heavy diesel fuel and bunker fuel oils. A typical fluid analysis of the Norman Wells crude yields the following:

FRACTION	Oil Analysis Percent		Analysis Percent Volume
	Liquid Volume	Mol.	
Methane	0.31	1.22	65.36
Ethane	1.58	4.16	20.46
Propane	3.53	8.70	9.30
Iso Butane	1.08	2.19	1.16
N Butane	3.06	6.45	2.09
Iso Pentane	1.11	2.02	....
N Pentane	1.23	2.28	1.63
	88.10	72.98	....

The total crude delivered and charged to the U. S. government was 1,649,604 barrels. Of this amount, a total of 356,112 barrels was processed through the Norman Wells refinery for the use of government contractors on the project.

Transportation and Costs

Transportation to the Norman Wells field is by water and by air. The air route from Edmonton is approximately 1200 miles and the frequency of flights is governed by pay load. In 1945 passenger fare for the round trip from Edmonton by air was $298.50. Air freight was 73 cents a pound.

Heavy freight moves in summer by rail to Waterways (Fort McMurray), thence by barge, propelled by shallow draft river boats, to the Arctic. Shipping charges from Waterways railhead to Norman Wells are $78 per ton for regular freight and approximately $198 per ton for refrigerator shipments.

The remoteness of the region makes for high costs. Labor must be imported and wages must be high to induce workers to remain on the job. Food supplies of all kinds must be shipped in. Large stocks of drilling equipment and material for all purposes must be carried because of the difficulty of getting replacements within a reasonable time. Imperial Oil, Ltd., also finds it necessary to supply medical and laundry service and some entertainment.

The cost of drilling wells in the Norman Wells field is difficult to estimate because the Canol Project was an abnormal undertaking during the war period when speed was essential and cost secondary.

Conclusion

When the United States government withdrew from the exploratory program and confined its efforts to exploitation of the Norman Wells oil field, the government of Canada removed restrictions on prospecting for petroleum in the Northwest Territories and Yukon. New regulations governing oil and gas in that region were issued on June 30, 1944.

These regulations provide for the issue of prospecting permits. Each permit covers an area of 400 square miles and the maximum number of permits allowed one company is eight, or an area of 3200 square miles. The permits run for three years and under certain conditions may be extended for an additional three years. The permittee must make a deposit of money or guaranteed bonds to guarantee that the required exploratory work will be performed, and must also submit reports with maps and plans regarding the work done. Having complied with the permit regulations, the permittee has the sole right to take up leases on his permit areas, but not to exceed 350,000 acres, about 547 square miles.

Imperial Oil Limited took up permits on the maximum area and in 1944, they began an exploratory program of geological and geophysical surveys and wildcat drilling. The wildcat wells completed up to October 1, 1945, all are within a radius of 50 miles of the Norman Wells field. During this winter of 1945-46 the company is actively engaged on a continuance of wildcat drilling and also in geophysical work with seismic surveys.

Well Costs

The cost for wildcat wells during 1944-45 was about $28 a foot. This does not include cost of leasing and exploration, nor rental on equipment acquired from the United States government.

As previously mentioned the United States government has a continuing interest in any oil discovered and developed by Imperiad Oil Ltd. in the Mackenzie River region.

The possible oil-bearing territory in the Mackenzie River valley is large and will require many wells to test it adequately.

To facilitate exploration generally in the Northwest Territories considerable assistance is being given to transportation. The government program includes a highway from the railway near Peace River, northward to Hay River at the southwest end of Great Slave Lake, and the dredging of streams along the water route north of Fort McMurray. Transportation companies are also being encouraged to increase and modernize equipment in order to cope with increased business that has already materialized. Thus when the supply of labor and material is sufficient, the exploration of this northern region will no doubt go ahead much more rapidly.

There are, of course, landing fields for planes at practically all the trading posts as far north as Norman Wells and also at Yellowknife on Great Slave Lake, and air travel by pontoon plane is already commonplace.

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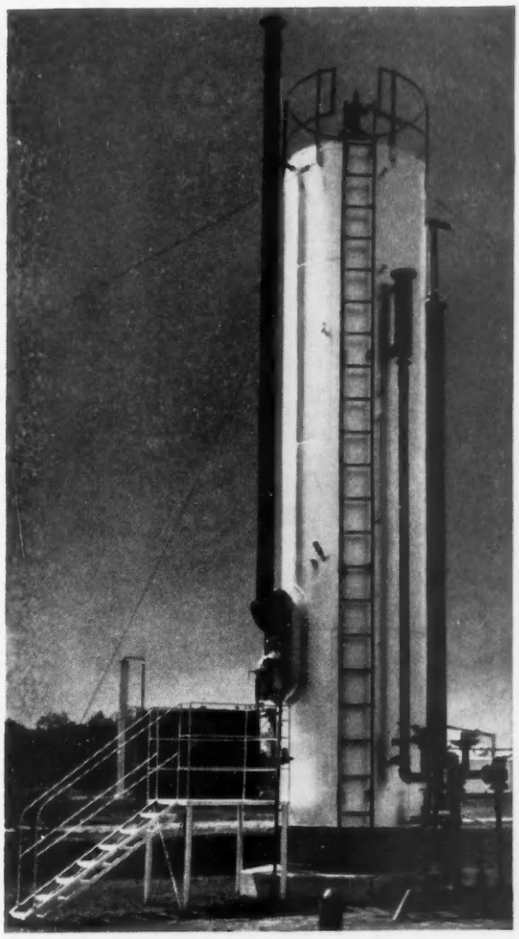

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International Council ISAP Plans Program for 1947 Petroleum Congress

THE annual meeting of the Permanent International Council of the South American Petroleum Institute (ISAP) was held in Santiago, Chile, Jan. 16-20, presided over by International President Carlos R. Végh Garzón of Montevideo, Uruguay.

Officers and delegates from the six active national sections discussed the formation of active sections in other countries of South and Central America where a substantial membership already has been enrolled.

The principal subjects considered by the council were the unification of methods of analyzing crude oil and petroleum products, standardization of petroleum statistics and nomenclature, and especially plans for the South American Petroleum Congress in Lima, Peru, March, 1947.

Official delegates to the council's meeting in Santiago were the following: from the Argentina section, Dr. Carlos E. Velarde and Bernardo Rikles; from the Bolivian section, Federico A. Rocha; from the Chilean section, Héctor Marchant, Roberto Muller, Alberto Cabero, Marín Rodríguez and Enrique Costabal; from the Ecuadorian section, Enrique Coloma Silva; from the Peruvian section, Roberto L. Valverde, Dr. Olaf F. Sundt and Sr. Enrique Normand; from the Uruguayan section, Carlos R. Végh Garzón and Germán E. Villar; from the Union of South American Engineering Societies, José Manuel Eguiguren.

To facilitate the work of the council during its annual meeting, the following committees were appointed: on internal matters, Dr. Carlos E. Velarde, José Manuel Eguiguren, Federico A. Rocha and Alberto Cabero; on technical matters, Enrique Coloma Silva, Bernardo Rikles, Roberto Muller and Enrique Costabal; on arrangements for the First South American Oil Congress in Lima in 1947, Roberto L. Valverde, Germán E. Villar, Marín Rodríguez and Enrique Normand.

On the subject of unifying methods of analyzing crude oil and petroleum products, it was decided to adopt as a basis the methods now in use by the American Society for Testing Materials, thus giving a continental character to the work. The subject will be put on the agenda for the Oil Congress. The subject of petroleum statistics was given attention and the desirability was emphasized of establishing a correlation between the metric system, widely used in South America, with the units of measure prevalent in North America. This subject also will be considered at the Oil Congress, which, it is hoped, will draw a good representation of oil men from the United States, Mexico, Venezuela and Colombia, as well as the countries represented at the council's Santiago meeting. Tentative program for the Lima meeting in March, 1947, the first South American Oil Congress, follows:

Geology and oil exploration.

Present situation in prospecting and exploration in South American countries; petroleum possibilities in South America; geological studies relating to petroleum exploration in South America; methods employed for petroleum exploration. Measurement of petroleum zones.

Petroleum production.

Present situation in crude oil production in South America. Immediate possibilities for increasing oil production in South America. Improvements introduced in drilling and producing oil.

Petroleum chemistry.

Chemical processes for heat decom-

Delegates to ISAP Santiago Meeting

Delegates present at the ISAP Santiago meeting are shown above as follows—First row: Ing. Enrique Coloma Silva, president of the Ecuadorian Section; Ing. Hector Marchant, president of the Chilean Section; Ing. Carlos R. Vegh Garzon, president of the Permanent International Council and of the Uruguayan Section; Ing. Roberto L. Valverde, vice president of the Peruvian Section; Dr. Carlos E. Velarde, vice president of the Argentine Section. Second row: Ing. German E. Villar, secretary-general of the South American Petroleum Institute; Sr. Enrique Normand, secretary-general of National Mining Society of Peru and delegate of the Peruvian Section; Ing. Federico A. Rocha, vice president of the Bolivian Section; Ing. Jose Manuel Eguiguren, delegate of the South American Union of Engineering Societies; Ing. Bernardo Rikles, secretary of the Argentine Section; Ing. Roberto Muller, treasurer of the Chilean Section. Third row: Ing. Enrique Costabal, delegate of the Chilean Section; Ing. Marin Rodriguez, delegate of the Chilean Section; Ing. Alberto Cabero, secretary of the Chilean Section.

position, polymerization, isomerization, hydrogenation, oxidation, etc., used in the oil industry. Use of petroleum products in organic synthesis. Obtaining similar or homologous products from petroleum constituents. Relationship between chemical composition and technical properties of oil products. Experimental methods used by the oil industry. Scientific investigation in the petroleum industry.

Petroleum refining.

Present position in refining oil and producing its derivatives in South America. Improvements and new methods used in refining. Possibilities of introducing new techniques in refineries of South America. Nomenclature used by the Latin-American oil industry.

Transporting and shipping oil and its derivatives.

Possibility of improving systems of transporting oil products in South America. Present situation in the pipe line system in South America, possibilities and convenience of its expansion. Improvements in systems of transporting liquid fuel within the limits of each nation. Moving oil from inland fields to the coast. Transporting natural gas and refined products. Shipment of petroleum products.

Transporting, consumption and use of petroleum products.

Future prospects for consumption of fuel oils in South America. Economy in the consumption of oil and its derivatives. Improvements and new methods introduced in the use of fuel oils. Preferred distribution of oil and its products with a look at the most appropriate use in each country. The use of super-heaters. Petroleum products as primary materials for the chemical industry. Different aspects of the utility of natural gas and refined products.

Supplies and interchange of fuels.

Combustible liquids needed to supply requirements of each South American country less the equivalent quantity of substitutes available for same. Amount which may be loaned by South American producers of petroleum to other countries in the same part of the continent and estimate of the amount eventually available. Quantity of solid fuels which South American countries not producing oil can exchange for an equivalent volume of petroleum products.

Health in the oil industry.

Security measures imposed on the oil industry for health. The oil industry as an important factor in improving the standard of living among workers. Treatment of residual liquids from refineries near large cities. Study of gases which escape from automotive vehicles in communities from a health viewpoint.

Laws and economics of the oil industry.

Position of law in petroleum exploration and exploitation. Oil prospecting and the mineral tax. Influence of economic and technical factors in development of the South American oil industry. Rules for evaluating petroleum. Characteristics of the oil market on the South American continent. Statistics on production, manufacture and marketing of petroleum products.

Education in the petroleum industry.

Preparing and improving technical and administrative personnel. Preparing and teaching workers and other personnel.

Shipments to Russia Total $39 Million In Nine Months

Exports of petroleum and products by the United States to Russia during the first nine months of 1945 were valued at $39,381,000, according to a report of the Department of Commerce.

During the nine-month war period, the U. S. sent 2,274,751 barrels of aviation motor fuel to the Soviet Union and 1,013,045 barrels of other motor fuels. Anti-knock compounds shipments totaled 54,114,000 gallons. Gas oil and distillate fuel oil exports to Russia were 1,040,534 barrels. Exports of lubricating oils were 268,188 barrels, while lubricating greases amounted to 1,896,000 pounds.

Says Russian Better Than German for U. S. Chemists

Russian should replace German as the principal foreign language in the American college chemistry curriculum because of the rapidly growing importance of Russian chemical research. J. G. Tolpin, instructor in technical Russian at Northwestern University, believes.

At present, many American chemists are missing much valuable information because of their unfamiliarity with Russian scientific literature, asserted Tolpin, a native of Russia and a graduate of the University of Kiev, who is editor of the "Survey of Foreign Petroleum Literature" sponsored by the Universal Oil Products Company.

"The volume of Russian chemical literature today is second only to that of American chemical literature," he said. "At least every seventh chemical paper in the world is published in the Russian language. This proportion may soon increase. Russian chemists claim a higher percentage also for the past, at least in some branches of chemistry."

In 1941 there were 40 national institutes in the Soviet Union devoted exclusively to chemical research, Tolpin stated, adding that Soviet industry at that time employed 50,000 college-trained chemists and had a capacity for training 5000 chemists and chemical engineers a year. A substantial proportion of Russia's chemists are women.

"Many of the chemical projects under development in Russia are parallel to those under study in this country and the data resulting from these Russian researches are pertinent to American industries," he declared.

Roumanian Crude Production Shows Increase for 1945

Roumanian crude oil production in 1945 amounted to 4,636,000 metric tons (34,009,696 barrels) as against 3,525,000 metric tons (25,859,400 barrels) in 1944, an increase of approximately 31.5 percent, according to an announcement by the Roumanian radio. The actual production in 1945 also compares with 4,100,000 metric tons (30,077,600 barrels) as ontlined in the nation's production plan.

Dominican Seaboard Plans Resumption of Activities

Drilling in the Dominican Republic, suspended for nearly a year pending further seismograph and gologic study, will be reusmed by Dominican Seaboard Oil Company, an affiliate of Standard Oil Company (New Jersey). The company was the first to conduct seismograph work in the Republic and will be the only company conducting drilling operations in the area.

Russians Exploit Field Regarded as Very Rich

Exploitation has started on a new oil field near Palvantasi in the Russian republic of Uzbekistan which is regarded as one of the richest oil fields in Central Asia, according to a report by the Dutch A.N.P.-Aneta Agency. The report added that more than 20 wells were already in operation in the field.

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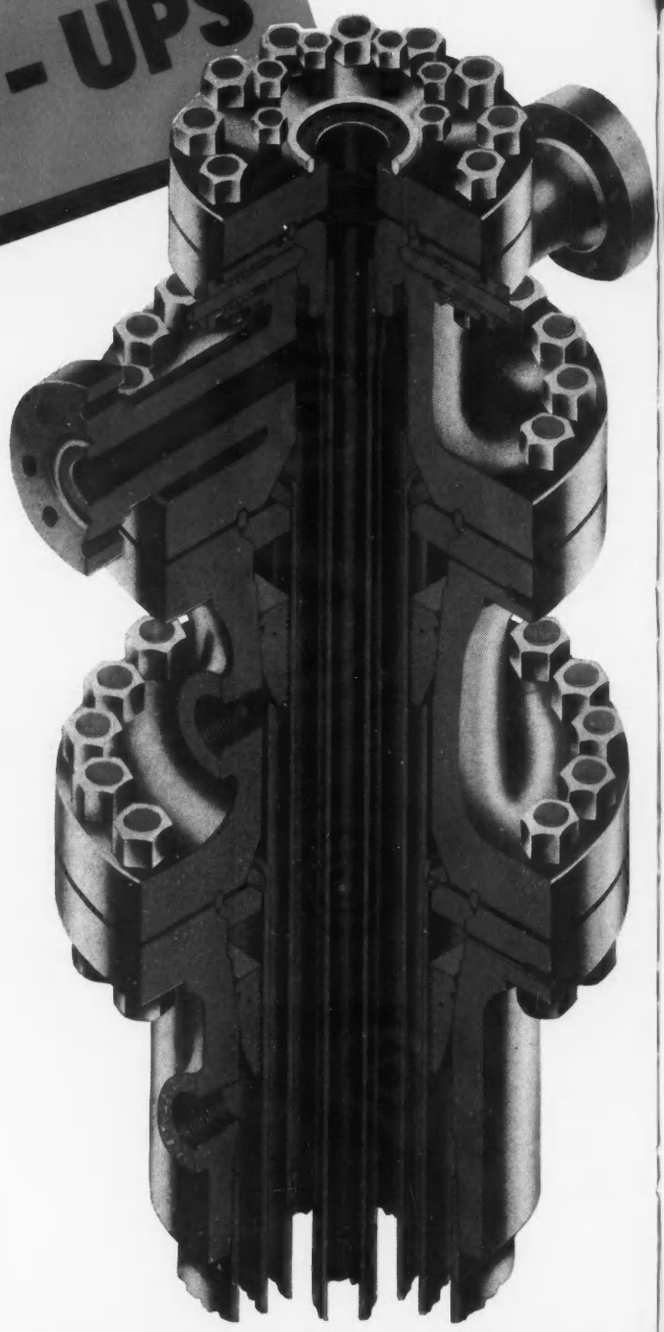

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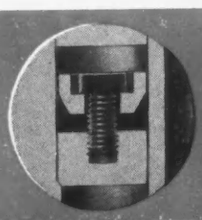

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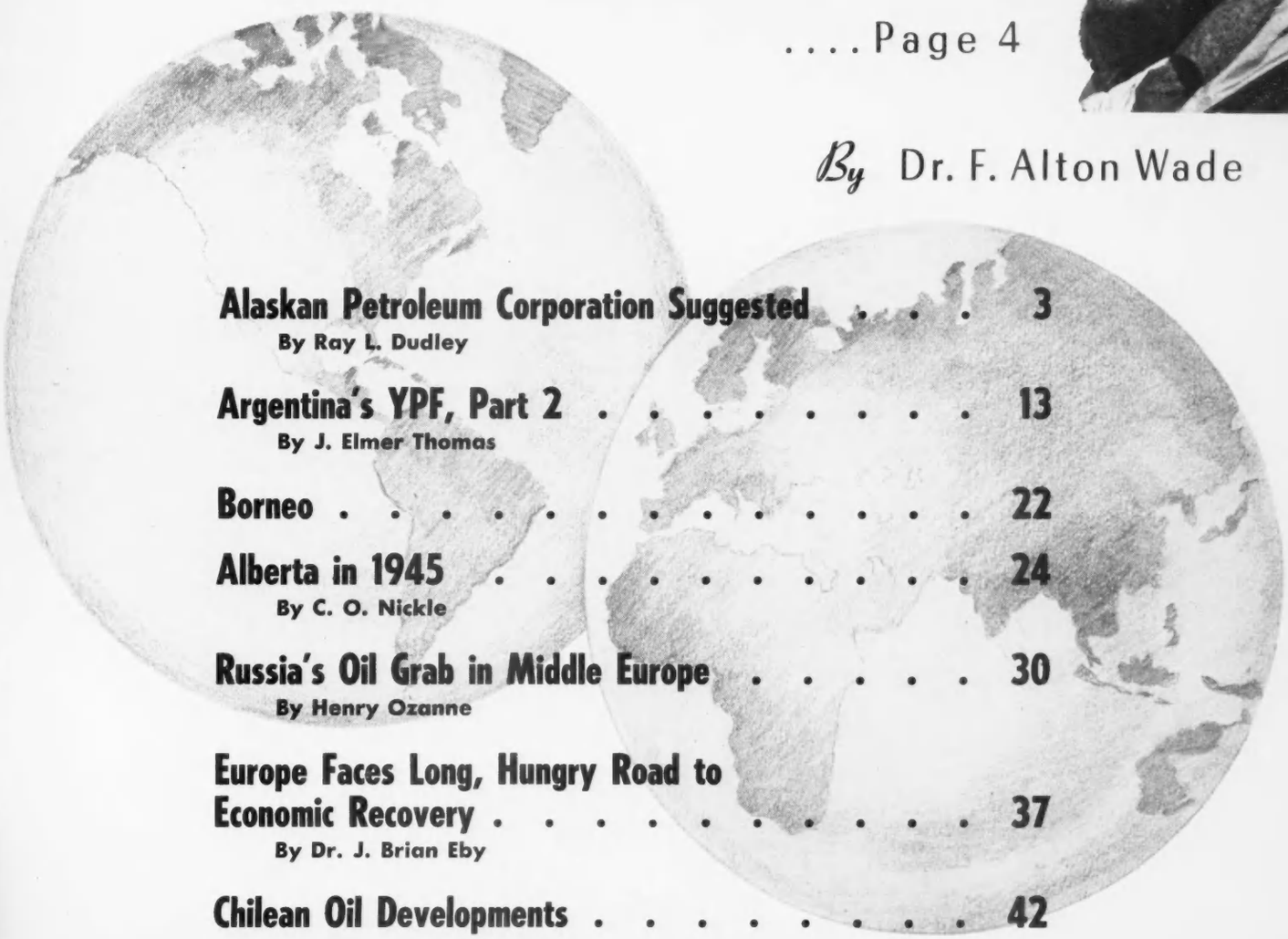

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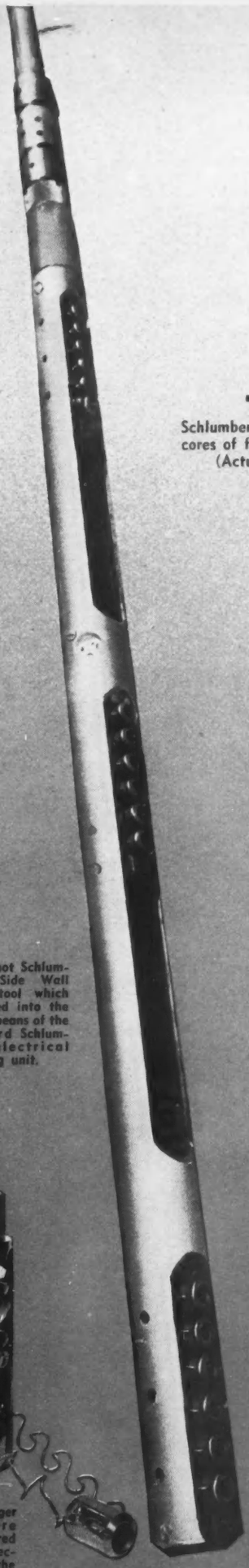
Schlumberger side wall cores of firm oil sands (Actual Size)



An 18-shot Schlumberger Side Wall Coring tool which is lowered into the well by means of the standard Schlumberger electrical logging unit.

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Alaskan Petroleum Corporation Suggested

AN EDITORIAL

By RAY L. DUDLEY PUBLISHER

WE READ with keen interest the reports from OIL WEEKLY Staff Representative McTee who, as the guest of the Navy, visited the Navy's petroleum operation in northernmost Alaska. His report stimulated a genuine appreciation of the fine work done by the Navy and the Seabees in fighting the elements and in getting started on one of the world's most difficult oil operations. Too, our admiration has been aroused by the fine work of the geologists who went ahead of the seabee expedition.

But, much as our admiration has been excited by those who put the Navy's plans into effect, we must confess that we feel that the Navy acted in an ill-advised manner, when, during the midst of a global war, it attempted an operation which could not possibly have had an effect on the early ending of the war.

The accusation has been made that the decision of the Navy to undertake the work in war-time was caused by the fear that if the Navy didn't get in first the Department of the Interior might later get the assignment. We do not know whether there is anything to this accusation, but we do know the Navy is dangerously near having a Canol on its hands, if, indeed, it does not have another "Canol" on its hands at this very minute.

We shall not deny that there probably are great potential reserves in Alaska. But we do not believe the Navy or any other governmental agency is the one to develop it. Probably the Navy feels the same way about it because we understand that if private enterprise is interested, the Navy would like to make what it would consider a fair deal.

Frankly, we doubt if, under present conditions, any private company would be willing to undertake the development of the Naval Reserve in Alaska. Possibly we are wrong. But it seems to us that with crude oil selling at the price it is selling at over the world, an oil company would find it a most difficult task to stay out of the red in Northern Aalska. (No play on words intended!) But, of course it is possible that some company, looking forward to a time in the future when conditions shall have changed, might be interested in making a deal with the Navy.

As to the Navy going ahead with its development, we suspect that when the real cost of the proposition becomes known, it may have trouble in getting funds.

From what study we have made of the work done there to date, which study has involved reading reports, seeing movies of the effort, calculating tonnage, and the laid-down-cost of that tonnage in the field, payroll, transportation, etc., the Navy has already spent more than $15,000,000 on the effort.

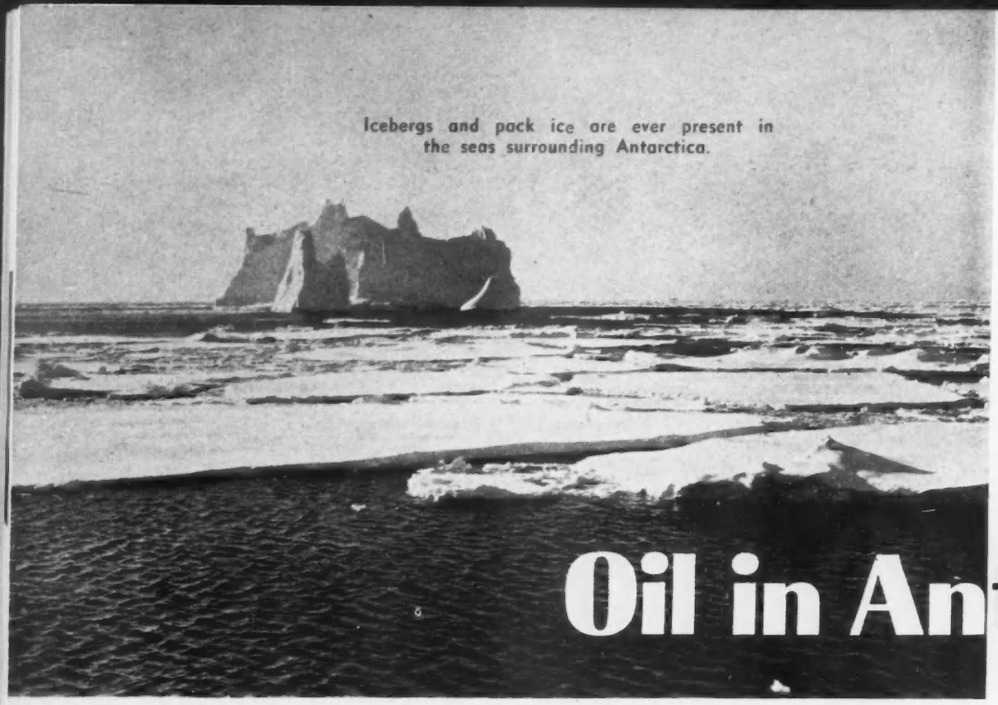
Drilling operations can be carried on only about 3½ months per year. Possibly this can be extended. Producing operations *might* be carried on during a longer period. Of that we are not sure but a study of what actually happened on te Canol operation should prove revealing.

What we are getting at is that the development of oil in U.S. Naval Reserve No. 4 is going to be a mighty expensive operation. We'd like for the Congress to learn more about just how expensive it will likely be, because unless the cost of the operation is appreciated by the Congress one of two things will likely happen: the operation will waste a great deal of the taxpayers' money, or such fantastic ideas as to the value of the reserve will be aroused (without appreciation of costs) as to make it impossible for private enterprise to do the job.

Thrown out as a rough suggestion, we should like to see those naval reserves developed in a sane manner, and by not one, but a group of companies contributing to a well directed effort. What about an Alaskan Petroleum Corporation, stock ownership in which would be held by a group of well-managed oil companies? A change in law would be necessary—but isn't the idea worth studying?

There may be, of course, important considerations of defense involved in the development of Naval Reserve No. 4, considerations not in the mind of the Navy when the Alaskan project was first started. On such considerations we have heard little discussion.

But from a practical standpoint such considerations would involve sound development of the reserves, and again we find ourselves led into the conclusion that for war or peace, the American people will be better off if private enterprise is given the job.



Icebergs and pack ice are ever present in the seas surrounding Antarctica.

Oil in Antarctica!

By DR. F. ALTON WADE

About the Author

DR. F. ALTON WADE, author of this exclusive article, is a geologist and a seasoned explorer of both Antarctic and Arctic regions. He has first-hand knowledge of some of the geological conditions existing at the "bottom of the earth," and says there are good reasons to assume that oil exists in some of the Antarctic formations.

Now assistant professor of geology at Miami University, Oxford, Ohio, Dr. Wade was geologist on the Byrd Antarctic Expedition II in 1933-1935. On that expedition he was a member of a party that surveyed the Edsel Ford Range in Marie Byrd Land. He later went back as senior scientist of the U. S. Antarctic Service Expedition in 1939-1941. On that occasion he was in charge of the entire scientific program and commanded the Snow Cruiser Unit. He was leader of the party that surveyed the Rockfeller Mountains in Edward VII Land.

Dr Wade was recommended to The Oil Weekly as a very able geologist and an outstanding authority for discussing the oil possibilities of the Antarctic region. This recommendation was offered by Dr. L. M. Gould, geologist and second in command of the Byrd Antarctic Expedition I of 1928-1930 and now president of Carleton College at Northfield, Minn.

Besides the work he did on the two Antarctic expeditions, Dr. Wade subsequently did work in Greenland which gives added authority to the portions of the accompanying article dealing with the practical problems of Antarctic exploration. As a major in the Air Corps in 1943-1944, he was in command of the Ice Cap Detachment in Greenland for 18 months, and had a good opportunity to observe modern equipment in operation in the polar regions. Greenland is the only other area on earth presenting similar operating problems, being a miniature Antarctica, with an ice cap covering similar to that at the South Pole.

MORE and more frequently are inquiring eyes being turned toward that great continental mass that occupies the position known as the "bottom of the Earth." Our known deposits of natural resources are being depleted at what many observers think is an alarming rate.

The unforeseen inroads into stock piles and reserves necessitated by the requirements of war have stimulated a systematic search for new deposits. This search is being widened steadily and it is only natural that the question as to the possibilities of finding, among other things, reserves of oil in Antarctica be raised seriously.

The continent of Antarctica occupies a unique position on the face of the earth. It is isolated from the rest of the world as no other large land mass is isolated. Three great oceans, the Atlantic, the Pacific, and the Indian, coalesce to form a water barrier many hundreds of miles wide around this southern continent. This great sea with its ever-present bergs and pack ice has been a discouraging factor to all but a few determined men.

Huge Land Mass

Relatively few people realize how vast a continent Antarctica is. Its area is estimated to be well over 5 million square miles, an area comparable in size to that of the United States and Mexico combined. On all of that great land not one person can be found who makes his permanent or semi-permanent residence. The reason for this is obvious.

Antarctica has not yet emerged from the last Ice Age and a continental ice sheet covers all but small portions of it. Except along sections of the coast, where seasonally penguins and seals are

plentiful, it is impossible to live off the land. In Antarctic waters a multi-million dollar industry has been carried on for many decades. During peace times a great whaling fleet operates each season around the continental rim, but what land bases that are maintained are on the islands and not the continent proper.

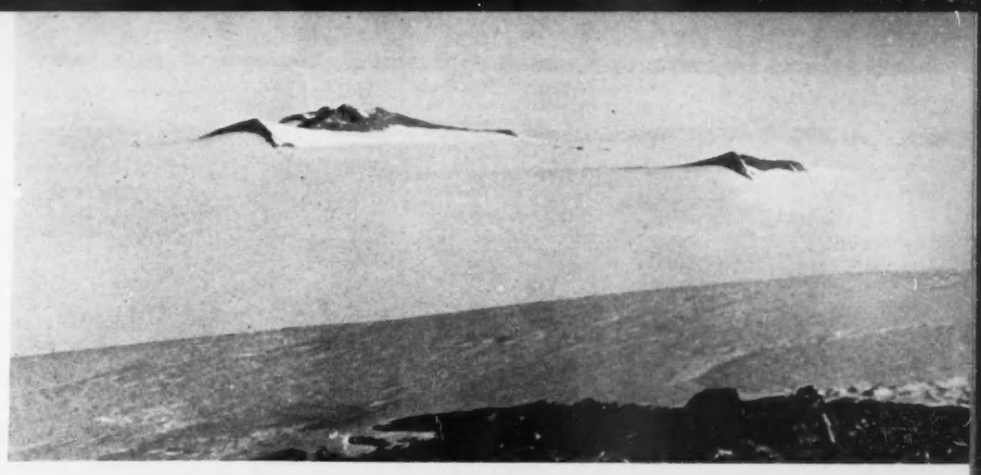
The mainland of Antarctica was sighted for the first time 125 years ago and has been visited by many expeditions since then. Yet, over three-fourths of the continent has not been seen or explored. Nearly all of the coast line has been charted, but the interior is largely unknown. Expeditions and exploratory-minded masters of ships of the whaling fleet have outlined the coast gradually. The secrets of the interior have been revealed more slowly because of the great difficulties and hazards of overland travel until very recent years. By making use of the airplane as an aid to exploration, more of the interior has been seen and mapped during the last 17 years than during the preceding 108 years.

The areas which are indicated on the accompanying map as "explored" areas might lead one to the wrong conclusion. They have been seen and mapped, but survey work by ground parties has been carried out in only a few small sections of those regions.

Indications of Oil

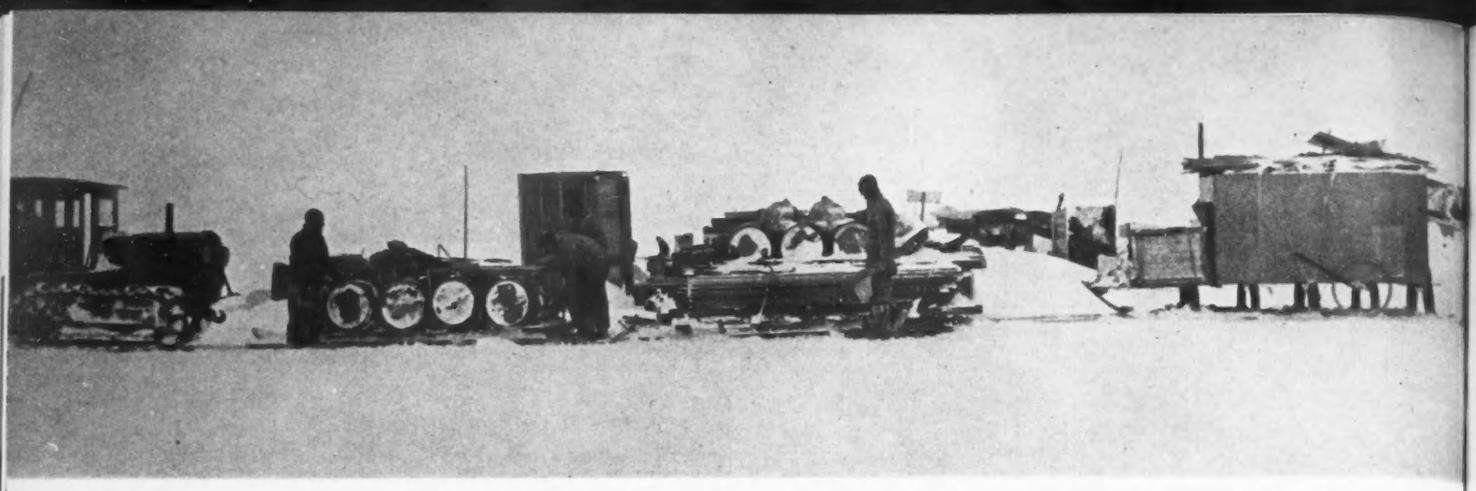
There is no reason for concluding that oil does not exist in some of the Antarctic formations. To the contrary, there are good reasons to assume that it does. Antarctica has not always been in the throes of a glacial epoch, nor has it always been the great emergent land mass that it is today. In many respects its history is comparable to those of the other continents. In a recent newspaper story Sir Hubert Wilkins stated, ". . . from an examination of the ice-free surfaces of the United States sector of the Antarctic, bounded on the east by Hearst Land and on the west by Marie Byrd Land, it seems that the Pacific sector of the Antarctic might hold the greatest pools of oil yet to be tapped on earth."

Marie Byrd Land has been surveyed more completely than has any other single area and a small amount of work has been done in the vicinity of Hearst Land. The dark strip connecting the two areas was observed from the air by Ellsworth and Holleck-Kenyon. The coast was mapped from aerial photographs taken by Byrd and members of his expeditions. The ground surveys have yielded no positive indications of favorable formations or structures and, surely, little can be told from photographs of mountain tops which protrude



Above, in Marie Byrd Land only the peaks of mountains protrude through the ice cap. Below, a Curtis Condor equipped with skiis was used for most of the survey and exploratory flights.

Above, the granite cliffs of Mt. Rea in Marie Byrd Land. Below, a convoy of six T-15s hauling building supplies.



A tractor train preparing for the trail. The machine was driven backward as it performed better in that running posirion. The low caboose was used for sleeping quarters for the crew.

through the ice cap. Great reserves of oil may be pooled in the formations of that section, but more complete information is necessary before anything more than a pure guess can be made about its potentialities.

Geology of Antarctica

In three sectors geological investigations have been sufficiently detailed to warrant conclusions regarding the chronological geologic history of those regions. Naturally, all three are mountainous, as throughout the continent only the mountains and bits of the coast are exposed.

Palmer Peninsula presents the greatest number of exposures, extends farthest north, and has been the center of the great whaling industry. For these reasons, perhaps, it is the best known. Several expeditions have wintered near the northern tip of the peninsula. Two have based on the west shore near latitude 68° S. From the data gathered by the members of these expeditions and by seasonal visitors it would appear that the mountains of Palmer Peninsula are a southern extension of the Andes of South America. In the northern sector the basement rocks include granodiorites and gabbros with definite Andean characteristics. Overlying the basement complex with its intrusives are strata of Mesozoic age folded in general from west to east. Sandstones, conglomerates, and a hard slatey rock make up the series. Many of the beds are highly fossiliferous and contain a rich Jurassic flora. A marine Cretaceous formation is next in the series and is overlain by marine Oligocene and Miocene beds. A Pliocene conglomerate is next. Volcanic activity appears to have begun in Miocene time and to have continued periodically until recently.

Only metamorphics and igenous rocks were noted on a traverse across the peninsula in latitude 68° S. and for 200 miles south along the Weddell coast. A great series of nearly flat lying sediments is exposed along the north and west coasts of King George VI Sound. These strata are Jurassic age.

The second well-investigated physiographic feature is the great Antarctic Horst which borders the Ross Sea and the Ross Shelf Ice on the west and south. This series of mountain ranges has been observed in profile in at least four places where it is dissected by the Reeves, Ferrar, Beardmore, and Thorne glaciers. Resting on the pre-Cambrian basement complex is a great series of Paleozoic sediments. The Cambrian is represented by limestone, the Devonian by shales and sandstones, the Permo-Carboniferous by the Beacon formation. The last named is a series of sandstone beds and intruded diabase sills (Cretaceous) with many included seams of coal. In one area the Beacon is at least 5000 feet thick and extends horizontally from 87° S. to the Adelie Coast. In the Beardmore Glacier region the thickness of the coal seams totals 300 feet with the individual seams varying in thickness from one to seven feet. In other sections the coal measures are lacking.

The third of the better surveyed sectors includes northern Marie Byrd Land and Edward VII Peninsula. Survey parties of the last two Byrd Expeditions have visited and mapped many of the outcrops in those areas. There has been found a thick series of folded and highly metamorphosed sediments of unknown age into which have been intruded granitic masses of batholithic proportions and accompanying dikes. A period of volcanic activity produced the most recent of the rocks in the area.

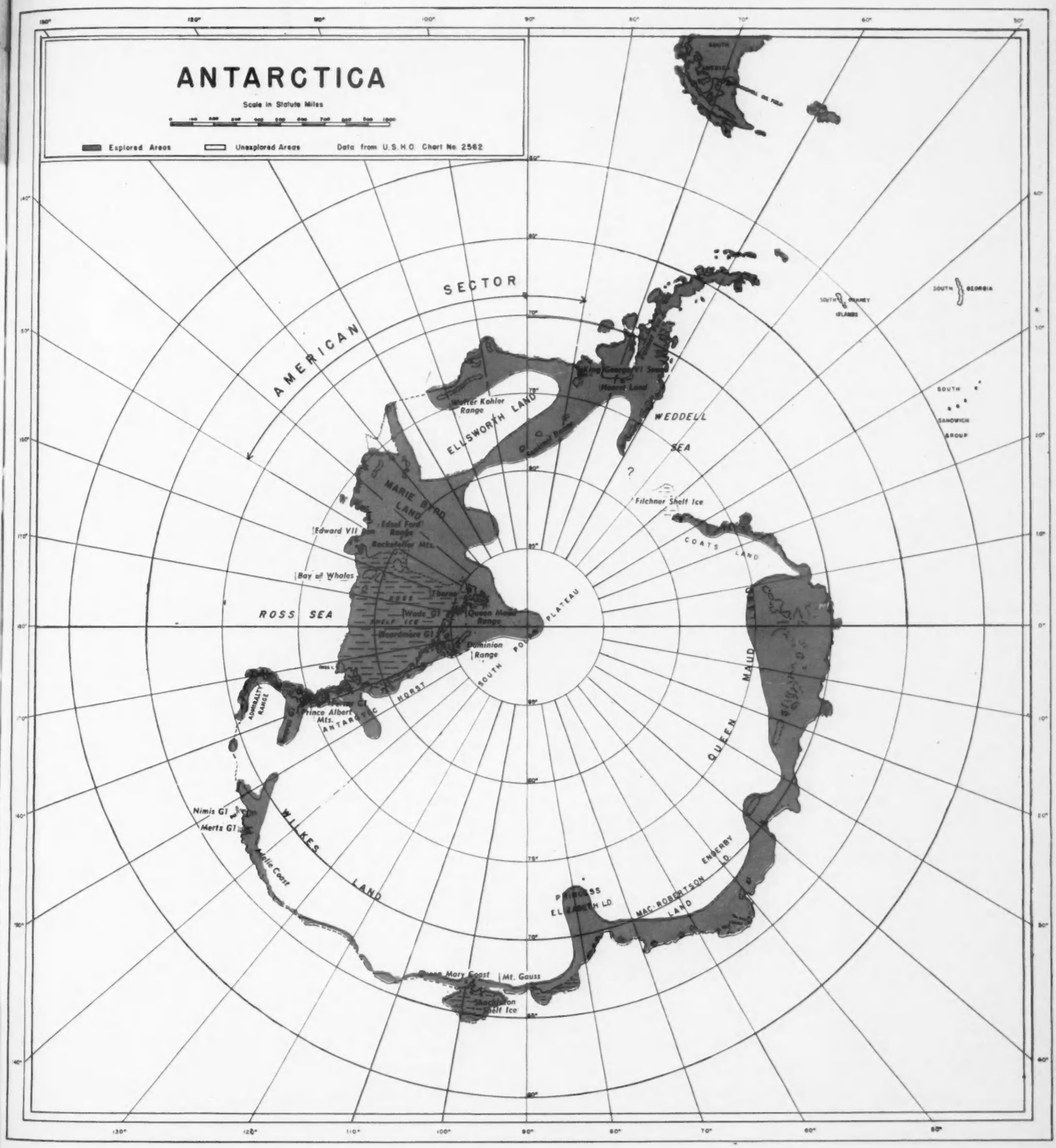
Sandstones Found

Rock specimens collected *in situ* on the Adelie Coast, Queen Mary Coast, in MacRobertson Land, and Enderby Land, have all been either metamorphic or igneous rocks. Occasional erratic specimens of sandstone have been collected in the morraines of some of these same lands indicating the existence of sedimentary formations farther inland.

Although Queen Maud Land appears in a large part as explored land on the maps, the exploration has been done from the air and not by land parties.

With such limited knowledge it would be difficult to indicate which sections

A modified medium weight army tank was used in 1939-1941 for heavy freighting operations. Note the extension plates which were welded to the tracks to increase the bearing surfaces.


ANTARCTICA
Scale in Statute Miles
Explored Areas
Unexplored Areas
Data from U.S.H.O. Chart No. 2562
AMERICAN SECTOR
ELLSWORTH LAND
WEDDELL SEA
MARIE BYRD LAND
ROSS SEA
ROSS ICE SHELF
QUEEN MAUD LAND
COATS LAND
WILKES LAND
PRINCESS ELIZABETH LD.
MAC. ROBERTSON LAND
ENDERBY LD.
SOUTH SANDWICH GROUP
SOUTH GEORGIA
Filchner Shelf Ice
Shackleton Shelf Ice
Queen Mary Coast
Mt. Gauss
Dominion Range
Queen Maud Range
Rockefeller Mts.
Edsel Ford Range
Bay of Whales
Prince Albert Mts.
Nimis Gl.
Mertz Gl.
Wade Gl.
Beardmore Gl.

A three-man crew prepared for a mid-winter trip to establish a temporary outpost station.

of Antarctica would be the most likely ones in which to search for oil. Thus far, the evidence is largely negative. Actually, we know nothing about the great central section of the continent. Is it a great central lowland as some theorists would have us believe? Or is it plateau-like in character? If the former, then it is covered by a sheet of ice anywhere from 5000 to 10,000 feet thick. Only a thorough seismic survey would reveal the elevations and configurations of the land surface. Such a survey would also reveal information about the underlying formations and the structures. It is believed that there may be a lowland or plains region between the Ross Sea and the Weddell Sea. If this is so, it might be a region similar to that which lies between Hudson's Bay and the Gulf of Mexico in North America. Repeated invasions by the sea under favorable climatic conditions might very well have resulted in the deposition of formations of oil source rock. It is an area that warrants investigation.

The sector between the coastal ranges and the sentinel range in Ellsworth Land should be further explored. From the photographs it would appear that the latter mountains are composed of a series of nearly flat-lying sediments. If so, they might be either plateau erosion remnants or fault block mountains. The areas to the north and south of them should be checked.

Problems of Exploration and Exploitation

Exploration of the south polar regions presents many difficulties and problems which are encountered in only one other area on the world's surface, Greenland. That island is a miniature Antarctica with an ice cap covering similar to the greater southern one. Other sectors of the north, such as Arctic Canada and northern Siberia, are vastly different. Techniques perfected during operations in those areas and equipment which performs with satisfaction there, too, are often totally unsatisfactory for ice cap work. The greatest hazard to surface transportation is the crevasse or open fissure. In many localities crevasses are numerous. They may vary in width from a fraction of an inch to well over 50 feet. Many seem bottomless. When they are open they can be avoided, but too often they are bridged with a thin layer of snow which gives way under the weight of man or vehicle. However, these areas, under favorable light conditions, can be spotted from the air and information regarding them can be relayed to ground parties.

The average temperature of the surface air on Antarctica is many degrees lower than for comparable latitudes in the north. At Little America on the Bay of Whales the means for seven months of each year were below zero ° F. Most of the continent lies below the Antarctic circle, so the major portion of the continent has a winter night during which many exploratory operations must be suspended. The best working season for interior operations is from October to March, inclusive.

With the advent of mechanized surface equipment and the airplane as aids to polar exploration and survey work, many of the difficulties and time consuming factors theretofore inherent to such work were eliminated. Byrd pioneered the way for the airplane and aerial mapping in the south polar regions when he made his flight to the pole and subsequent flight to Marie Byrd Land in 1929, although the value of observations from the air had been indicated when Scott made the only captive balloon ascent in Antarctica in 1902. Over-snow vehicles were first used with great success to transport heavy loads and for survey work by the members of the Byrd 1933-35 expedition. However, a very satisfactory vehicle for work on polar ice caps has not yet been developed. As a matter of record, the machines used on the Byrd 1939-41 expedition were inferior to those used six years previously. The giant Snow Cruiser, designed by Dr. T. C. Poulter and the Armour Research Foundation, was a step in the right direction but, unfortunately, it was underpowered and could not be used for the surface and subsurface survey work on the polar plateau for which it was designed.

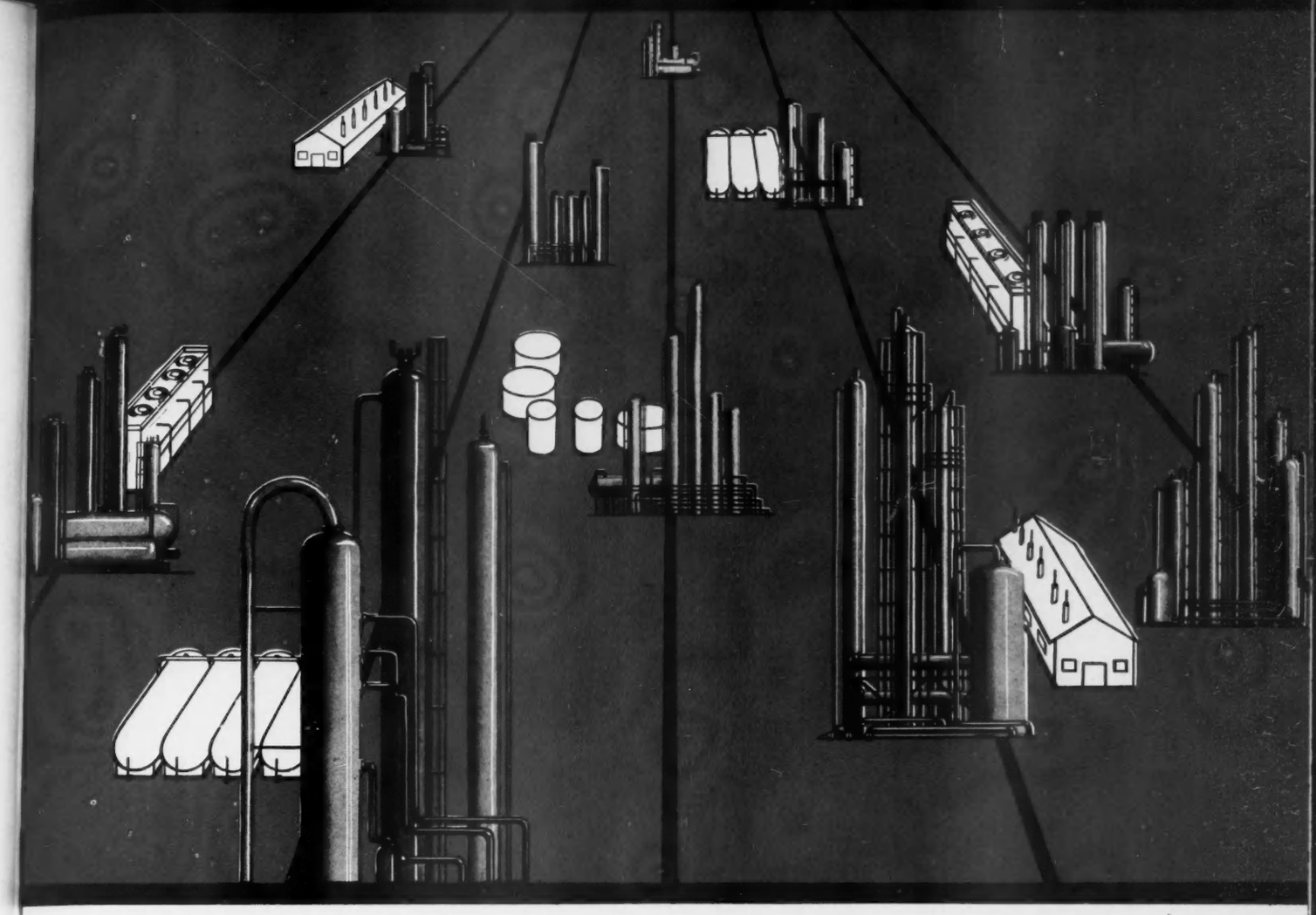
During the recent war many advances were made in the design of and equipment for machines for cold weather operations. The problem of winterization of airplanes has been largely solved, but planes used in the north were equipped with wheels and operated from fields with hard surface runways. On the ice cap planes must make use of skiis. Heavy cargo planes must be equipped with retractable skiis for efficient operation and thus far they have not been developed.

Snowmobile's Efficiency

For heavy freighting operations over snow surfaces, the Canadian Snowmobile is probably the best machine available. This machine is undergoing severe tests on the present "Musk Ox Operation" in the Canadian north. The "Weasel" might prove to be satisfactory for quick reconnaissance trips, but not as a prime mover. The writer commanded a unit that operated on the Greenland Ice Cap during 1943-1944. The prime mover used was the T-15, which is a machine similar in most respects to the "Weasel". Frequent mechanical failures of differentials and the fact that they operated efficiently only on relatively hard surfaces when pulling loads eliminates them as prime movers.

No satisfactory determinations of the thickness of the polar ice cap have been made. Attempts were made to measure the thickness by a series of seismic soundings of the plateau ice southeast of the Bay of Whales in 1934. Interpretation of the results was unsatisfactory. However, successful measurements of the thickness of the seaward portion of the Ross Shelf Ice were made by that method the same year. The Greenland Ice Cap was sounded with fair success in 1931. There is no reason to believe that a satisfactory technique can not be developed.

If, through prospecting, favorable structures are located in the rock for-



Avenues of Progress

Hudson personnel has specialized in process design from the early days of single product absorption gasoline plants, when a plant processing 12 million feet daily was considered a large project, to the present era of high pressure plants in unitized fields, processing up to 350 million feet daily and producing as many as nine different liquid products.

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The giant Antarctic Snow Cruiser. Designed as a mobile base, this machine was to have been used for surveying and sounding the ice of the polar plateau. It proved to be underpowered.

mations below the ice sheet, they certainly could be tapped in the usual way with some modifications. Drilling through glacier ice presents difficulties not encountered under ordinary circumstances. As long as the drill tools are in motion all goes well. As soon as motion stops, even momentarily, the entire string freezes solidly to the walls of the hole. The sub-zero temperatures preclude the possibility of the extensive use of water as is the general practice. Such difficulties can be overcome. However, once a hole is drilled and cased through the ice layers and underlying formations, the troubles are not at an end. The layer of ice is not static as are the underlying rocks. Glacier ice moves. It overides the rock slowly, but surely. The rate of movement may be only a few feet each year, or many feet, but in either case disaster to the well is imminent. In some areas the ice may no longer be moving. Deglacierization of Antarctica is in progress and thus such a static condition may be possible locally. The mentioned difficulties and many more can be overcome. Ingenious Americans have solved more difficult problems in the past.

A Proposed Program

Systematic attack upon the unknowns of the Antarctic continent can be carried on efficiently with the right men and the proper equipment. To be efficient it must be done on a large scale. Today it would be a waste of money to send small expeditions with limited equipment and personnel into the field. Rivalry for small exploratory honors should be eliminated and an overall systematic, well-coordinated plan should be developed and put to use.

Coastal bases should be chosen from which both land and air operations could proceed into the interior. The unknown sectors should be aerially mapped until the surface picture is completed. A systematic survey of the exposed formations should be carried out and seismic soundings should be made to determine the thickness of the ice sheet, the configurations of the rock surface, and the structural features of the underlying rock formations. Airplanes and ground parties should work in close coordination. Routes should be surveyed from the air as a safety precaution and field parties should be supported and supplied by airplanes. Inland bases from which survey parties could operate can be established. The use of glider trains for transporting materials, supplies and personnel to such outposts should be considered. A smoothly working organization should have several coastal bases where supplies and equipment can be unloaded from ships. From each coastal base survey parties, both ground and aerial, could operate. Strategically located outposts could be maintained from the nearest coastal stations. A comprehensive program of scientific research should be combined with all exploitation operations. To merely send survey or work parties into the field would be a mistake and the loss of a golden opportunity. It is sometimes difficult to convince the layman of the ultimate value of research in pure science, but the fact remains that indirectly, if not directly, such research has been responsible for the great advancement of human knowledge. Such fields as terrestrial magnetism, meteorology, glaciology, physiology, biology and many others should not be neglected.

The success of any such program, large or small, lies in the hands of the men who are sent into the field. A great majority of men are not adaptable to a life of isolation in the polar regions. That statement is strikingly supported by the records of units operating in the far north during the recent war. Each individual, whether he is to be a technician or a unit boss, must be carefully chosen. The importance of this can not be overemphasized.

Concluding Remarks

On the Antarctic continent is the last great frontier on the surface of the earth that has not been rolled back by man. What mineral wealth, including oil, is hidden there no one knows. It has been found that within every other continental mass great deposits of natural resources have existed. Why should Antarctica be an exception? The small amount of exploratory work there has revealed the existence of a coal reserve estimated to be second in size only to that of the United States. Why not oil? Why not ore minerals?

Today the natural resources of the United States are slowly but surely being depleted. Soon we must look to other lands. The only one left to which we may look without arousing the ire of other nations is Antarctica. The United States' claim to the so-called American Sector is as good as, if not better than, the claims of other countries to certain sectors. It behooves our government to secure that sector and others to which we have rightful claim. An Antarctic exploration unit should be organized and put into the field without delay. Such an organization should have the official approval and backing of the United States government. The financing of such a unit should be borne proportionately by every American citizen as it would be to the interest of each individual. Certain phases of the exploitation and research program should be financed by individuals, companies, and research foundations, but all efforts should be coordinated by one central office.

The time to act is now before other nations do so. Alaska was called "Seward's Folly" at the time the United States purchased it. The unexpected dividends have certainly been large. Greenland could have been ours, but the chance was passed up. Now we are sorry. Antarctica may be another Alaska. We can not afford to miss such an opportunity as is presented to us today.

Part 2

Argentina's YPF

By J. ELMER THOMAS,
Consulting Geologist, Fort Worth

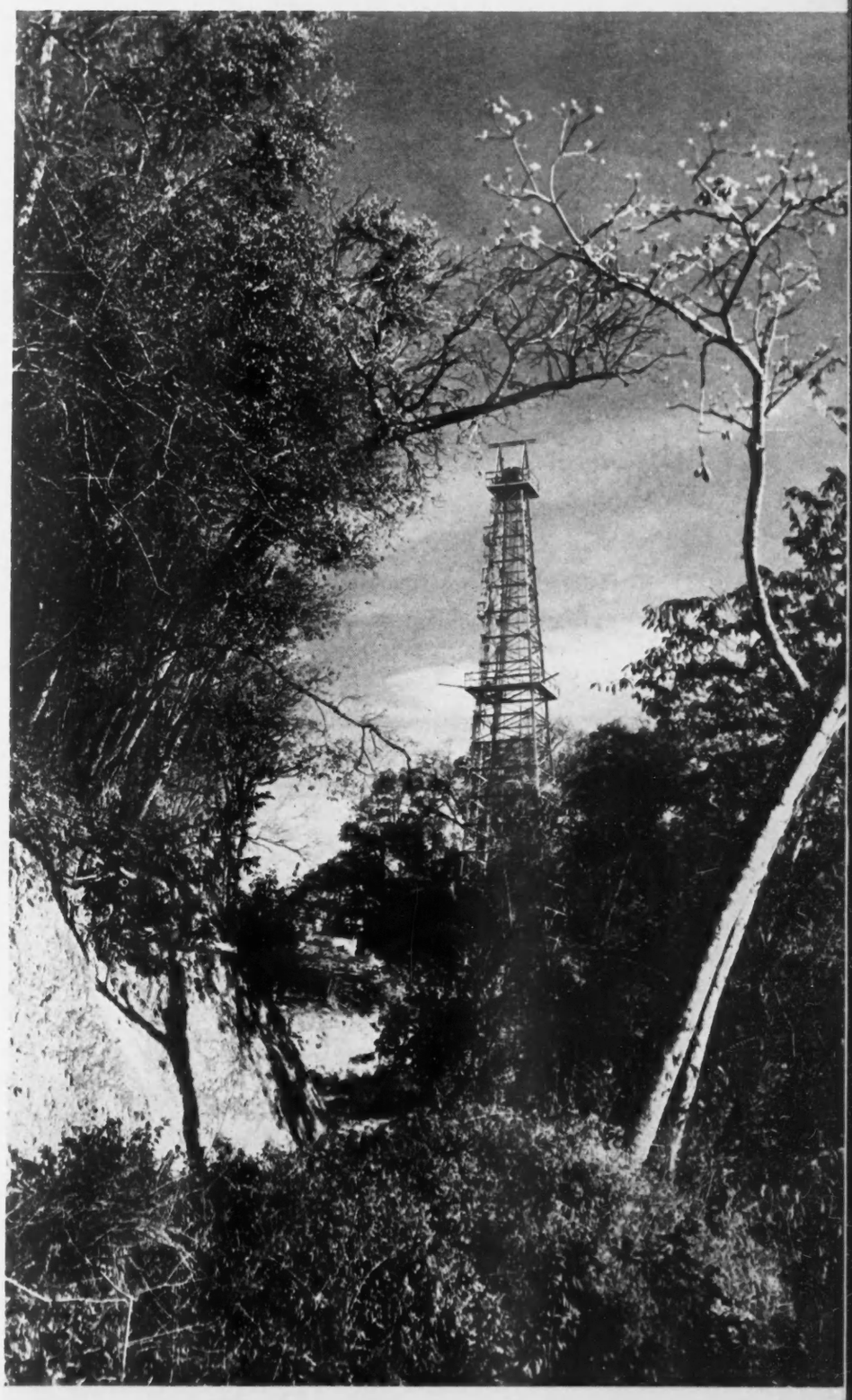
DEVELOPMENT of the oil industry in the Argentine has been steady and progressive since 1907, when the first well was brought in as water was being sought in Comodoro Rivadavia, but more particularly since 1910 when the government formed a general department for petroleum exploration in that area, and since 1922, when Yacimientos Petroliferos Fiscales ("Government Oil Fields") was organized. Since that time, YPF, as it has come to be called, has been in complete charge of Argentina's oil development and as pointed out last month (THE OIL WEEKLY, March 4, 1946) almost uninterrupted growth has characterized its handling of the industry since that time.

Expansion and Integration

The development of production at Comodoro Rivadavia progressed very slowly in the first five years, with only 130 barrels per day in 1912, but already preparations were being made for more active operations. The earliest oil wells at Comodoro Rivadavia were close to the shore; now the productive areas have been extended out under the sea in two places. Buenos Aires, the principal consuming center, was 947 nautical miles distant by sea and in 1913 a steel pier 3500 feet long was built at Comodoro Rivadavia for use in loading tankers. A small refinery was constructed there in 1913 but the big plant at La Plata, 40 miles southeast of Buenos Aires, was not built until 1926. After that, crude was no longer consumed as a fuel, but was processed at the YPF refineries.

Production Development

The YPF production history is shown by Fig. 4, which records annual production by years by separate producing districts. Comodoro Rivadavia since the beginning has been the largest source of crude for Argentina and for YPF. To date it has furnished 79 percent of the country's output and the YPF production there has been 80 per-



Building a derrick at Tranquitas, a mountainous region in northern Salta

YPF well at Mendoza

cent of its total output. Several of the producing areas are not fully defined laterally and some have undoubted deeper possibilities. Electrification was introduced at Comodoro Rivadavia and a power plant for 21,000 kilowatts built in 1926, later enlarged to 24,000. All drilling and operating there is electrified.

The second oldest producing area, Plaza Huincul in the Province of Neuquén, was discovered 30 years ago but furnished no substantial production before 1922. It reached a peak of 1700 barrels per day in 1931 and then declined for several years. Additional discoveries there rejuvenated it, the 1931 peak was passed in 1940, and it continues to move steadily higher, having furnished 5300 barrels per day last year.

Salta, the third district brought into production, is on the northern border, adjacent to Bolivia's minor producing areas. After 15 years of operations there the YPF properties passed their peak, 3500 barrels daily, in 1942 and now are furnishing only half that amount. There are still some known but untested structures in that rather rugged terrain and one drilling rig is maintained on wildcats.

Mendoza, in the province of that name, is the latest addition to Argentina's producing districts but quickly assumed second place in importance. In the last four years it has declined slightly from its 1941 peak, 9000 barrels per day, but its development has not been pressed because the fields are relatively deep and require large quantities of the reduced amount of materials, short during the war. Once they are again obtainable in quantity this area is expected to attain greater importance.

Production of each of these fields is shown in Table 2.

Natural gasoline plants have been established in all fields. Through frequent inspections of United States fields, engineers have kept abreast of the best modern practices.

Exploration is most active and was described in a companion article, "Argentina's Production During the War Years" (THE OIL WEEKLY, February 4, 1946).

The cost of finding oil in Argentina has been given much study.

A statement by a YPF official gave the total exploratory expense in Argentina to date, including the government and the private companies, as between $35 million and $37 million, reported as representing between 4.9 and 5.3 percent of the value of the crude reserves discovered, which is very favorable. That would assign a value of $700 million to $750 million to the total crude discovered. The cumulative total of crude produced in Argentina amounts to 340 million barrels, and the future reserves have been estimated at 260 million barrels, which gives a total ultimate of 600 million barrels. A valuation of only 1.25 per barrel, indicated by the above figures, seems quite reasonable.

The statement added that this compares with figures of 10 to 20 percent of the value, in other countries, which might be an approximate average, and with a figure of 40 percent in the United States in the last two years. Discovery costs here certainly have risen in the past two years but it is perhaps a little early to make a very exact estimate of the reserves which have been discovered in so recent a period.

TABLE 1
Comparative Activity, YPF and Private Companies

	PRIVATE COMPANIES				GOVERNMENT			
	Annual Production (in Barrels)	Feet Drilled	Wells Comp.	Wells Producing	Annual Production (in Barrels)	Feet Drilled	Wells Comp.	Wells Producing
1939	8,390,634	414,625	153	1278	10,222,533	652,533	164	1854
1940	8,134,505	347,680	120	1274	12,474,655	721,226	187	1950
1941	8,006,899	406,858	149	1356	14,006,572	878,568	226	2150
1942	8,321,425	460,568	162	1448	15,382,736	885,528	203	2355
1943	8,274,564	436,850	119	1426	16,560,947	656,528	144	2465
1944	8,024,272	363,109	122	1463	16,205,361	483,206	103	2490
Total	49,152,299	2,429,680	825	....	84,852,804	4,277,589	1,027	....
1945*	7,421,797	.....	.....	....	15,439,170	.....	....	....

* Estimated.

Refinery Development

As the four widely spaced producing areas came into importance, local refineries were constructed in or near the oil fields to take care of demand in the surrounding territory. Thus we find the 1500-barrel per day plant at Plaza Huincul, the 1900-barrel plant at Salta (Chachapoyas), the 3000-barrel plant at Mendoza (Lujan de Cuyo), besides those placed in the heavy consuming centers, the 9500-barrel plant at Rosario and the 31,500-barrel plant at La Plata. When the latter was completed the small refinery at Comodoro Rivadavia was abandoned. The Godoy Cruz plant was abandoned in 1940 and its equipment added to the more important installation at Mendoza. Operation of the small plant at Vespucci in northern Salta was discontinued in 1941, and in 1944 the Campaña refinery just north of Buenos Aires was converted into a TNT plant. The current refinery capacity is rated at 49,500 barrels per day.

Of foremost importance have been the liquid fuels but in 1933 YPF marketed the first lubricants of its own manufacture and reported finding "little buyers' resistance". In addition to liquid

A portion of the Restinga Ali field, off-shore at Comodoro Rivadavia

fuels and lubricants, YPF refineries now make the following specialties: base stocks for aviation gasoline, kerosine for torpedos, hectane for toluene, ole-margarine chlorate, iso-octane polymerized for aviation gasoline, absorbent kerosine for the extraction of natural gasoline from gas, synthetic rubber, insecticides, asphalts and rust-proof paints.

Transportation

There are no trunk pipe lines in Argentina. Apart from field gathering systems, petroleum transportation is handled primarily by railway tank cars and river and ocean tankers. Two small tankers were placed in operation as early as 1914. By 1935 YPF had built up a fleet of ocean and rivertankers totalling 50,000 tons and since then this has been increased to 80,000 tons. It would have topped 100,000 tons today except for the loss at sea of one large tanker and some smaller ships.

Figure 3, the oil map of Argentina, shows the principal lines of crude movement from the four main producing areas. From Comodoro Rivadavia it moves by tanker to Bahia Blanca, 514 nautical miles, or to La Plata, 947 nautical miles. From Plaza Huincul the crude not refined locally is moved by tank car to Bahia Blanca on the coast, a distance of 375 miles. From Mendoza, that not refined there is carried 650 miles east by rail to Buenos Aires. From the Salta fields on the Bolivian border, some crude moves by rail 375 miles southeast to Formosa on the Paraguay River, whence it is taken by river tankers to Rosario, in the province of Santa Fé, 850 miles, or on to Buenos Aires and La Plata on the Plata Estuary. Other crude from the Salta fields, including some 300 barrels per day imported through a four-inch line from the Bolivian fields just across the border, moves south 200 miles by rail to the Chachapoyas refinery in the City of Salta, from which crude and products can move southeast by tank car 650 miles to Rosario.

Marketing

As soon as the first refineries were built, YPF proceeded to acquire bulk stations, tank trucks and full facilities for distribution. Starting in 1914, bulk depots were built in different parts of the country, the first at "South Docks" on the Plata Estuary at Buenos Aires with a capacity of 37,000 barrels. Plants next were installed at Rosario, Santa Fé, Concepción Córdoba and other important inland points. As its distributing system spread, YPF took credit for reducing and equalizing the prices of petroleum products. Its entire marketing system now comprises more than 1000 agencies, 1500 branch agencies, 600 service stations and 7500 pumps.

Natural Gas and Coal

In connection with its oil operations YPF has developed large quantities of natural gas, both dry and wet. The gas reserves as estimated a few months ago are given below, and the preponderance of wet gas to dry, five to one, is noteworthy.

Estimated Gas Reserves
(In Cubic Meters)

District	Wet Gas	Dry Gas
Comodoro Rivadavia	214,160,139	38,779,150
Plaza Huincul	23,129,534	20,843,420
Salta	66,048,108	
Mendoza	18,926,597	
Total	**322,264,387**	**59,622,570**

To utilize this gas several steps have been taken. At Mendoza 50 miles of gathering lines have been laid and a pipe line built from the Tupungato field to the city of Mendoza. Studies have been made for a similar installation at Salta, as well as at Plaza Huincul and at Comodoro Rivadavia. It was contemplated that the large supply at Comodoro Rivadavia might be brought by

TABLE 2
Argentina—Crude Oil Production

	Como. Rivadavia		Plaza Huincul		Salta		Mendoza		Total		Grand Total
	YPF	Private A	YPF	Private B	YPF	Private C	YPF	Private D	YPF	Private	
Cumulative to 12/31/43	137,506,552	99,959,151	10,394,011	11,264,056	6,514,912	16,626,162	13,218,743	319,236	167,634,218	128,168,606	295,802,824
1944	10,226,615	6,875,895	1,923,249	445,005	961,665	682,081	3,094,396	21,292	16,205,360	8,024,273	24,229,732
1945	9,719,333	6,402,912	1,958,171	385,640	668,803	618,867	3,092,862	14,322	15,439,170	7,421,741	22,860,911
Cumulative to 12/31/45	157,452,500	113,237,958	14,275,431	12,094,701	8,145,380	17,927,110	19,406,001	354,850	199,278,748	143,614,620	342,893,367
Average Production Daily, December, 1945	25,481	13,008	5,881	1,006	1,478	1,698	8,674	38	41,514	15,750	57,264

A Includes Diadema (Shell), Ferrocarrilera and Astra. B Standard Oil Company. C Standard Oil Company. D Rio Atnel (El Sosneada).

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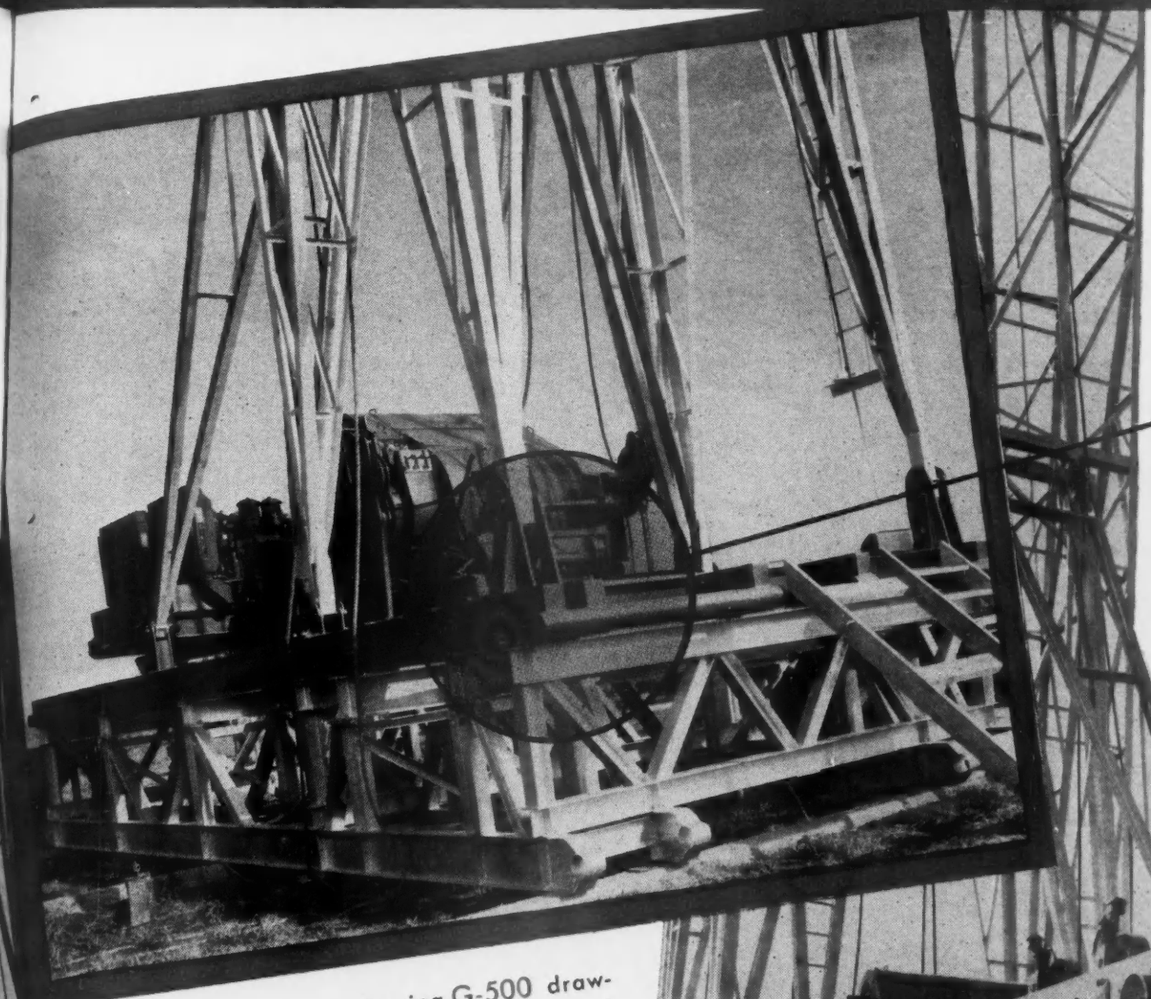

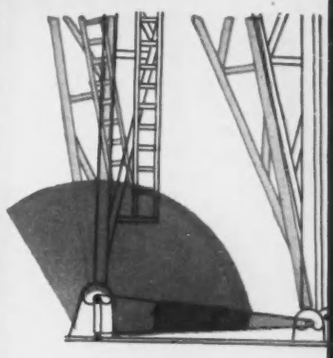

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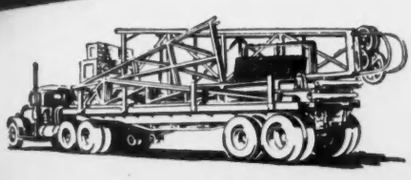
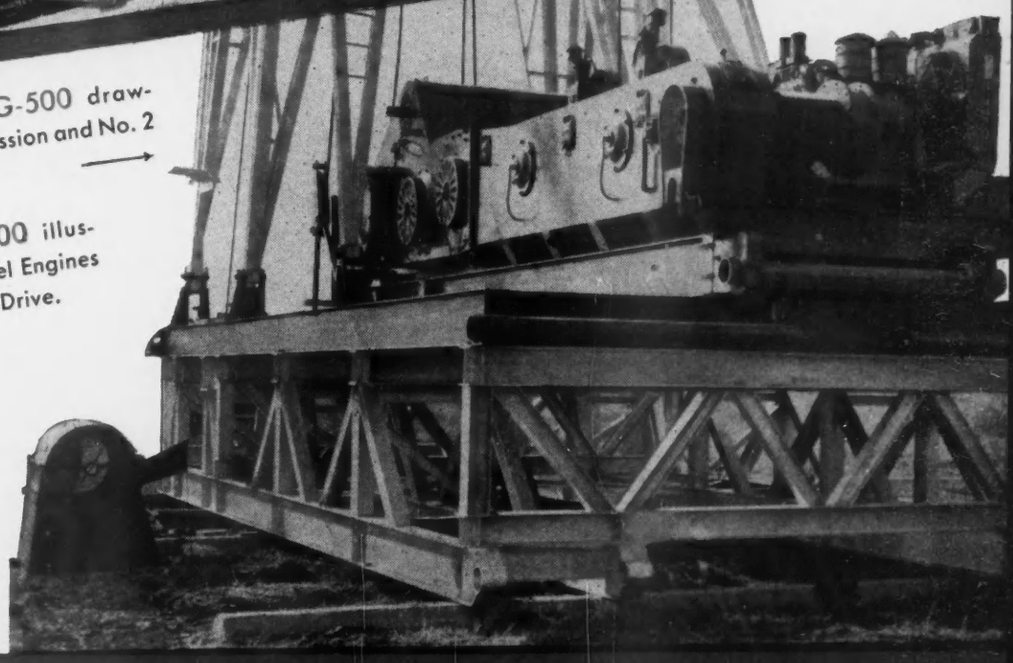
Right: Side view showing G-500 drawworks, Compounding Transmission and No. 2 Engine. →

Left: Side and rear view of G-500 illustrating G-M Series 71 Twin 6 Diesel Engines and Fawick Air-Flex Clutch Pump Drive. ←





CONTINENTAL

SERVING THE OIL AND GAS INDUSTRIES

YPF refinery at La Plata, south of Buenos Aires. This is the company's largest plant.

pipe line to Buenos Aires but such major construction was out of the question during the war. The distribution system at Buenos Aires was purchased by YPF early last year and the system connected to the refinery at La Plata.

Along with its geological and topographic work, YPF was also charged with the responsibility of mapping coal reserves. Work to that end has been conducted in the Provinces of Salta, Mendoza, San Juan, Catamarca and La Rioja, and in the Territories of Chubut, Santa Cruz, Neuquén and Rio Negro. In the Rio Turbio Mine of Santa Cruz the deposits mapped are estimated to contain 6,300,000 tons of good quality coal, and at Cancha Carreras, also in Santa Cruz, an additional 2 million tons deposit has been mapped.

Natural gas and coal, however, are no longer the responsibility of YPF. In accordance with Decree 22,389, of September 20, 1945, Argentine has created a National Bureau of Energy, under the Ministry of Commerce and Industry. Going into effect January 1, 1946, it has a subdivision for gas, natural and manufactured, electric generating power, coal and hydro, agricultural products used for fuel, alcohol, charcoal and wood, as well as solid mineral fuels.

The new program in Argentina removes the supervision of natural gas and coal from YPF. The results of this separation will be studied with some interest since, with the broader experience gained here, and over a much longer period of time, it has not seemed possible for man to segregate the production of natural gas from the production of crude oil, because Nature did not.

The Capital Account

Naturally, all the growth and expansion both for production and refining required large sums of money, but it is the proud claim of YPF that it required treasury funds only at the outset (1907-1916), totalling $8,655,240.90 Argentine pesos, or $2,163,810.23 U. S. at the present rate of exchange. Its current assets, in excess of 1 billion pesos, or $250 million, seem large by comparison with American standards for a company with 45,000 barrels daily production and 50,000 barrels daily refining capacity.

Most of the expenditures have been in the producing division and Table 1 shows the meters drilled by YPF and the number of operated wells by years by districts. It is interesting to compare the equivalent figures in recent years for the private companies, whose expansion was drastically restrained by law more than 20 years ago.

Present Position

Wartime transportation difficulties found Argentina better off than any other South American country not an exporter of oil. And yet, after 34 years of repeated and increasing successes in its oil operations, the 45,000 barrels per day produced by YPF was only 65 percent of Argentina's crude oil output and perhaps 40 percent of the country's consuming requirements. These latter are somewhat difficult to calculate closely but the shipping problems and materials shortages necessarily caused a shrinkage during the war years below what would have been Argentina's normal demand growth. During the first half of 1945, with coal imports down to 20 percent of normal, Argentina burned 150,000 tons of food stuffs monthly.

The restrictions against expansion by the private companies would seem to have imposed an obligation upon the government's operations to reach self-sufficiency in oil, but that was not attained when materials were abundantly available. The operations were profitable and, remembering the reported 4 percent finding cost, an accelerated tempo would have been no drain upon the national treasury. The untested possibilities of the country must be very large and perhaps, when supplies become plentiful again, a greater effort will be made to attain self-sufficiency.

It seems perfectly fair, however, to point to a parallelism with the Soviet Union, and raise a question as to the degree to which individual enterprise and competition enter into the equation. Geology and geophysics, both inexact sciences, are notably benefitted by "multiple attack"—different views, different theories and different methods of the scientists and, of no mean import, different reactions by the operators to that "illimitable vista of hope" which is wildcatting. East Texas had its "Dad" Joiner, who risked a test where others would not drill, or had not drilled. It also had its Ed Bateman as well as J. E. Farrel.

The very able scientists of the Soviet Union announced in 1937 that their oil reserves, in all categories, totalled 50 billion barrels. The United States reserves at that time were estimated at less than ⅓ of that figure. Yet five years later we were shipping petroleum supplies, by long and devious routes, to bolster their war effort. One thing that was lacking there—and it is also missing in Argentina—is such a group of earnest and determined men as crowded the hotel lobbies in Jackson when the Mississippi oil strikes were made!

It has become a political problem, as well as an economic and technical one. Various countries have attempted different solutions and no single trend is now discernible. Yet this writer—whose memory goes back to Cushing and Healdton in 1914, to Ranger in 1918, Mexia in 1921, Signal Hill in 1923, and to many others since then—could express a preference.

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One of the most important oil ports in the Netherlands Indies is Balikpapan. Petroleum and petroleum products accounted for a large share of the total tonnage which passed through this port before the war. The large refinery at Balikpapan is indicated by arrow in above photo. Below, an aerial view of the refinery at Balikpapan, Borneo's largest.

Aerial views of one of the oil fields north of the port of Balikpapan. This area includes the Sanga Sanga and the Kutei pools where approximately 400 wells produced 9,476,000 barrels of oil in 1940.

Alberta in 1945

A seismograph party shooting in the Southern Foothills of Alberta, where grain fields and rolling ranch lands blend into the mighty Rocky Mountains. Seeking new "Turner Valleys," seismograph crews are working the year-round in the 350-mile-long foothills belt.

By C. O. NICKLE, Staff Correspondent

THE high hopes built up by the string of oil and gas strikes in Alberta during 1944 fell far short of realization during 1945, despite follow-up drilling of discoveries and an active wildcat program. At the end of 1945, Alberta still had one major oil and gas field, the waning Turner Valley, plus a string of large natural gas fields and a number of comparatively small oil producing areas.

Last year brought the discovery of so-far minor oil pools at Hay Lake and South Princess, expansion of the Conrad pool discovered in 1944, and large extensions to the Medicine Hat, Princess and Viking-Kinsella natural gas reserves. With the exception of Viking-Kinsella, on the Central Plains, these favorable developments took place on the Southern Plains.

The importance of the 1945 strikes and extensions will be more fully determined by development in the current year. While it is unlikely they will result in proving major oil fields, they may substantially add to production and reserves.

Chief 1945 hopes for proving of major oil fields lay in the Alberta Foothills Belt, along the west side of the province, which yielded the Turner Valley field. The hopes failed to materialize during 1945, but at least two structures now under development are regarded as bright 1946 prospects.

While 1945 was not a happy year for the major and independent operators in Alberta, they look to the future with optimism. Geological knowledge of this still relatively undeveloped province is growing; one major oil field, several big gas reserves, and a number of small oil pools have been uncovered; and there is no ground for believing that a region which has given this much encouragement will be found devoid of other important fields.

1945 Drilling

One hundred twenty-four wells were completed in Alberta during 1945, down 16 from the 140 completions for the previous year. Primarily responsible for the drop was Turner Valley, where completions slumped to 17 compared with 42 in 1944. Of the 124 completions the past year, 46 obtained oil production, 16 completed as gas wells, 5 were still on test at year's end, and 57 were abandoned.

Standard Oil Company of California was Alberta's leading operator, in point of number of completions. The company drilled or participated in a total of 48 of the year's completions, involving a total footage of 166,354 feet. All these wells were on the Southern Plains.

Imperial Oil, Ltd., and its subsidiaries led in point of footage, drilling or participating in a total of 27 of the year's completions, involving total footage of 188,203 feet. The wells included 18 Foothills wells (15 in Turner Valley) with a total of 150,832 feet. Seven wells were on the South Plains and two on the Central Plains.

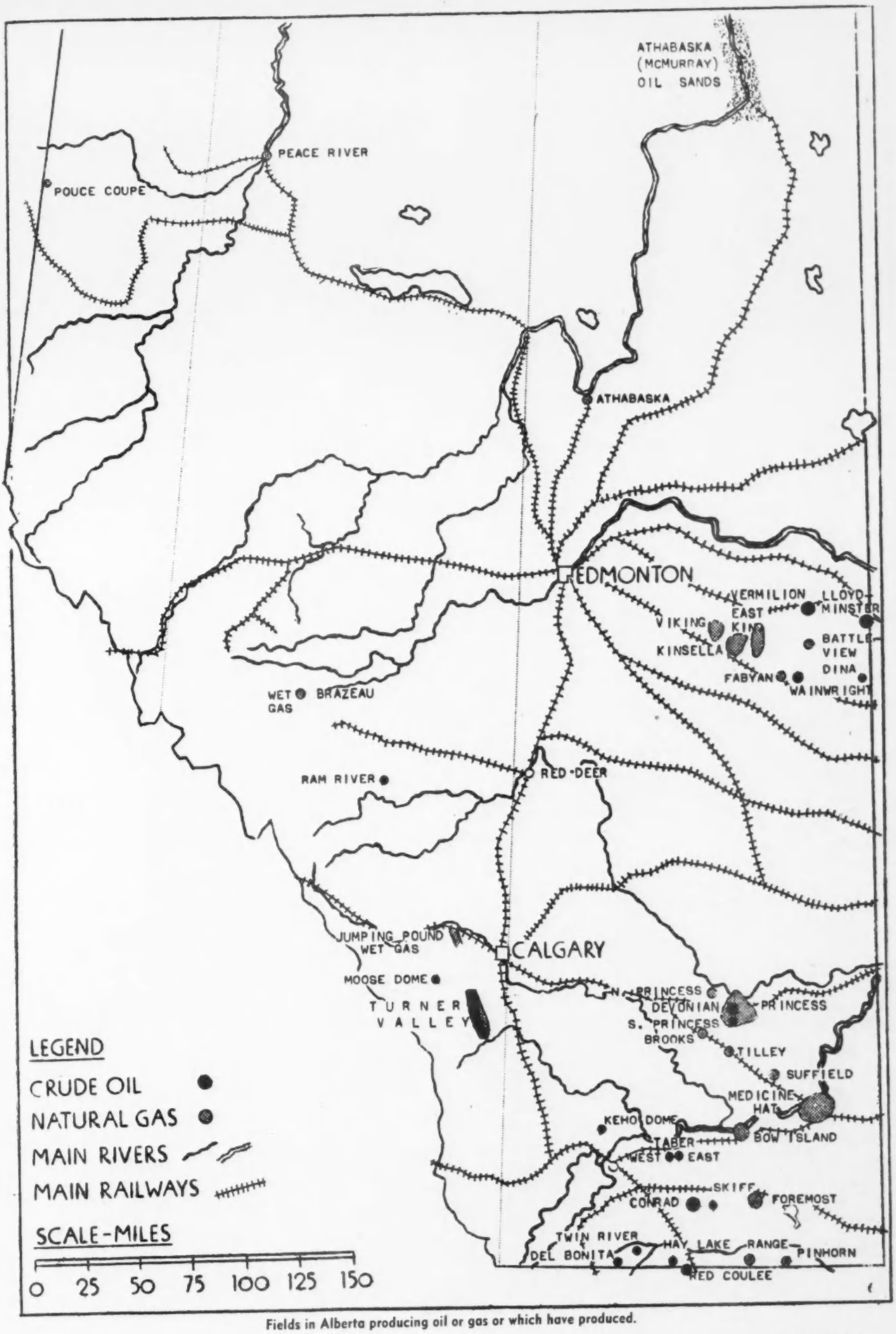
The remainder of 1945's completions were accounted for by a lengthy list of major and independent concerns. Outstanding among these is Thomas L. Brook, Toronto oil operator, who in 1945, as in 1944, ranked next to Standard and Imperial on the completions scoreboard. In 1945 he was instrumental in completing ten wells, all on the South Plains, for a total footage of 33,971 feet. These wells were drilled by British Dominion Oil & Development Corporation and/or Mid-Continent Oil & Gas Association — companies headed by Brook—in association with other independent concerns. In 1945, Mid-Continent and East Crest Oil Company, Ltd., accounted for a north extension of the Conrad field, while British Dominion in association with Admiral Oils accounted for an oil discovery at Hay Lake Dome.

1945 Discoveries and Extensions

The Conrad field, a 3000-foot Ellis (Jurassic) sand pool discovered in July, 1944, by California Standard, was exploited during 1945, with 27 wells drilled in the field and within a six-mile radius. Of these, 14 were successful, 13 failures. Yielding 25 to 27 gravity oil from an Ellis pinchout on the east flank of a limestone high, the pool is subject to local variations in permeability and porosity. Under ¼ mile spacing, offsets have ranged from dry holes to wells capable of pumping over 200 barrels daily.

In March, 1945, Mid-Continent and East Crest Oils 1, a mile north of the discovery and ½ mile north of a dry hole, completed with a 200-barrel initial yield. North and east offsets found the sand too tight to yield commercially. During the year, however, California Standard filled in the area between its discovery and M-C-E.C. 1 with producers, and extended the producing area a mile south of its discovery. At year's end the producing area was 2¼ miles in length and up to one mile wide, with full limits not yet determined. Production in 1945 was 143,696 barrels, compared with 24,733 in 1944.

In June, 1945, the Empire-Pacific 1, drilled by a group of independents six miles south of California Standard Devonian oil wells at Princess, completed as a Chert zone oil discovery at 3323



Fields in Alberta producing oil or gas or which have produced.

Wildcat well drill crews in Alberta compete with the weather during the winter months, with temperatures sometimes 40 below, and crews isolated from the outside world by heavy snows. Here is the winter camp for the drill crew at the Brazeau wildcat.

Home-Brazeau Syndicate 1, Central Alberta Foothills wildcat, last week tested 10½ million cubic feet of wet gas daily against 310 pounds tubing and 660 pounds casing pressure after acidizing with 4000 gallons in a Madison limestone sliver between 9498-9597 feet. On the edge of what is regarded as one of the brightest "big structure" prospects in Alberta, the well is to be followed by a new venture to the west.

Photo by Bernard Parry

feet. Initial yield was 45 barrels daily of 28 gravity oil on pump. The Chert is the erosional surface of the Madison limestone.

In August the Empire-Pacific 2, ¼ mile south of No. 1, completed as a Madison limestone discovery at 3315 feet, flowing 60 barrels of 28-gravity oil and 6000 Mcf of gas daily. The Chert, source of No. 1's oil, was absent. This well was carried through to the Devonian dolomite (source of 34.5-gravity oil at California Standard's Princess discovery six miles north), but the section was water-bearing.

In May, 1945, the Peerless Syndicate 1, three miles southeast of the Princess Devonian oil wells, completed as a Sunburst sand (Lower Cretaceous) discovery at 3184 feet, with an initial flow of about 45 barrels daily of 28-gravity crude, accompanied by very little gas.

In October the National-Empire 1, 4½ miles south of the Princess Devonian wells and 1½ miles north of the Empire-Pacific Chert-Madison wells, completed as another Sunburst sand discovery at 3288 feet, with an open flow potential indicated of 40 to 50 million cubic feet of gas daily and upwards of 15 barrels hourly of 26 to 28-gravity oil. In the same month, California Standard's Patricia-CPR 1, 3½ miles west of the National-Empire well, found the Sunburst at 3308 feet with open flow potential indicated in excess of 10 million cubic feet of gas daily, plus some oil.

During 1945 California Standard followed up its 1944 discovery of 34.5-gravity oil in the Devonian dolomite at Princess. By year's end, the pool was delimited by water to a thin strip 1¼ miles long with five producers. Wells failing in the Devonian, however, found gas in large volume in the Sunburst sand or other upper horizons.

This series of developments in the general Princess area further established the section as a large gas reserve (estimates at this stage range up to 300 billion cubic feet) and opened prospects of oil production at future wells from one or more formations of the several now established as oil-bearing. Oil production from the Princess area in 1945 was 63,377 barrels, compared with 13,815 barrels in 1944.

In September, 1945, Admiral Oils and British Dominion 1, testing the Hay Lake Dome about four miles north of the Montana border on the Southwest Plains, completed at 3094.5 feet as a Madison limestone oil discovery. Initial yield on pump was about 100 barrels daily of 28-gravity oil. A follow-up offset, however, found water, and water came in at the discovery within a short time. Pumping is continuing, with recovery of oil somewhat smaller than the initial rate.

During 1945 six wells were successfully completed in the Medicine Hat area to enlarge this Southeastern Plains gas field to about 58,000 acres, and boost estimates of remaining reserves to a minimum of 170 billion and a maximum estimate of 400 billion. This field, discovered in 1890, is producing from shallow depth (925 to 1225 feet) from an Upper Cretaceous sand. Production to date has amounted to approximately 150 billion cubic feet, with current market around 4 billion yearly.

On the Central Alberta Plains, Imperial Oil, Ltd., commenced a gas exploration program late in 1945, objective being expansion of gas reserves east and north of the big Viking-Kinsella gas fields. Prior to the Imperial program, the proven area covered about 50 square miles, with reserves estimated at some 200 billion cubic feet. S. E. Slipper,

Petroleum Production in Alberta—Years 1940 to 1945 and Cumulative

SOURCE:	Year 1940	Year 1941	Year 1942	Year 1943	Year 1944	Year 1945	To 12-31-45 Cumulative
Turner Valley:							
Oil Production	8,180,325	9,537,221	9,701,719	8,991,528	7,878,128	7,009,521	75,701,491
Natural Gasoline	274,172	293,122	302,216	461,169	448,186	412,540	5,428,530
Total Turner Valley	8,454,497	9,830,343	10,003,935	9,452,697	8,326,314	7,422,061	81,130,021
Vermilion Oilfield	10,817	22,051	56,819	93,258	234,603	238,358	656,108
Taber Oilfieds	.....	5,600	29,819	88,735	148,638	135,900	427,210
Wainwright Oilfield	7,527	11,733	14,510	18,136	17,154	16,472	223,025
Conrad Oilfield	.....	.....	.....	.....	24,733	143,696	168,429
Armelgra Area	.....	.....	.....	462	.....	.....	462
Dina Area	4,746	3,894	2,780	200	.....	.....	37,352
Del Bonita—Twin River Area	3,444	4,393	1,653	1,862	9,366	4,091	30,861
Jumping Pound Area	.....	.....	.....	.....	.....	3,471	3,471
Keho Lake Area	.....	.....	.....	.....	.....	.....	955
Lloydminster Oilfield	1,648	416	477	2,640	6,296	28,321	40,146
Moose Dome Area	351	.....	.....	2,205	628	.....	8,977
Princess-Steveville Area	.....	19,587	10,478	340	13,815	63,377	108,112
Ram River Area	.....	.....	.....	.....	207	.....	207
Red Coulee Oilfield	12,177	11,626	10,107	8,928	3,835	.....	328,711
Skiff Area	.....	.....	.....	.....	.....	.....	8,298
Tilley Area	.....	.....	5,718	5,065	3,137	593	14,513
Total Other Fields	40,710	78,300	132,361	221,851	462,412	633,379	2,056,837
Total Alberta Production	8,495,207	9,908,643	10,136,296	9,674,548	8,788,726	8,055,440	83,186,858

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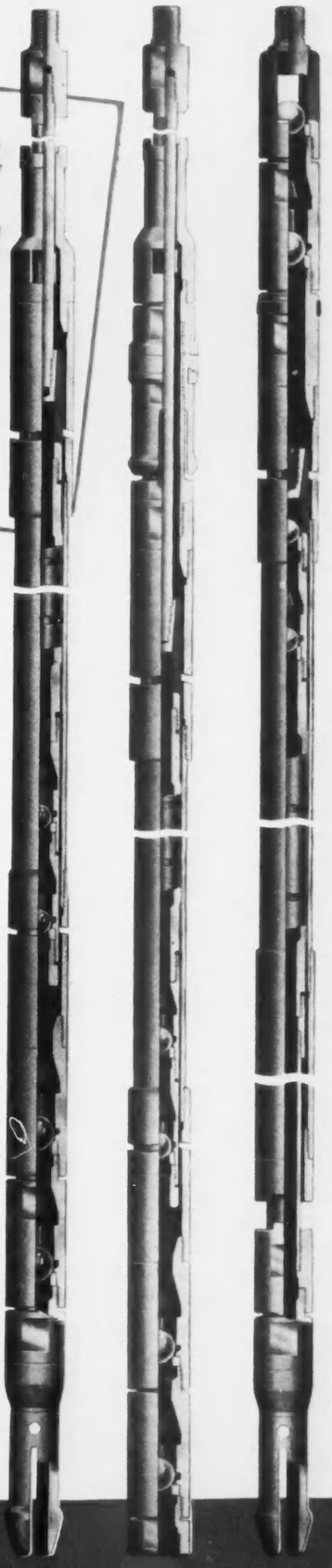

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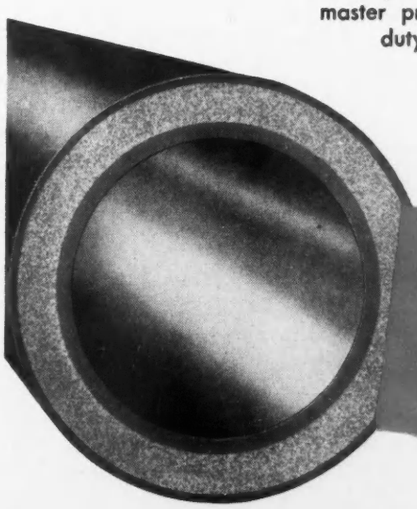
Due to the thickness and uniformity of the wearing surface produced by heat-treating operations, "Improved Insert" barrels can be repeatedly re-honed at a reasonable cost, thus providing additional operating economies.

This unique barrel, when combined with an Oilmaster precision-ground plunger and heavy-duty, alloy steel fittings, provides a modern, deep-well, rod-type, insert pump unparalleled in the field of sub-surface pumping equipment.



Cross-sectional view of the Improved Insert pump barrel, showing how super-hard wearing surfaces for long life are combined with ductile core for toughness.

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McColl-Frontenac Oil Company geologists, working new territory in the Central Alberta Foothills, photographed this unique folding of Lower Cretaceous rocks. A 300-foot high exposure of interbedded sand and shale is folded at right angles, with no apparent breaking of the layers.
Photo by Dr. Hugh Beach

geologist for Northwestern Utilities, Ltd., operator of the twin fields, estimated that 400 square miles in the area were proven or semi-proven, and placed probable gas reserves at 600 billion.

Imperial's results to date substantiate the Slipper View, the company obtaining 7 to 9 million cubic feet gas flows at recent completions 8 to 12 miles east of the Northwestern Utilities fields. Source of the gas is Viking sand, in the Upper Cretaceous, at depths from 1940 to 2375 feet.

Future of Alberta Gas

The continuing Imperial Oil gas exploration program has aroused much speculation. The major cities and towns of the province are already served with natural gas, and have adequate reserves established from fields now supplying them for upwards of 50 years at current rate of consumption. (The Edmonton city system and intervening towns are supplied from the Viking-Kinsella fields, with current consumption about 8 billion yearly; the Calgary-Lethbridge system is supplied mainly from the Turner Valley field with consumption comparable to the Edmonton system; and Medicine Hat city from the field surrounding that center.)

The big Princess area gas reserve and others indicated on the Plains are shut in for lack of immediate market. Imperial's recent Kinsella gas well completions, and wells completed by California Standard and others in other areas have been capped.

Speculation on Imperial's program therefore centers on the proposition that the company is seeking huge new gas reserves, large enough to warrant establishment in the province of new industries based on synthesis of natural gas to produce gasoline, alcohol or other products. If this proves correct, new importance will be attached to the lengthy string of gas strikes made in the province in 1945 and before, in the course of the search for petroleum.

Chief 1945 hopes for proving of new major oil fields in Alberta lay in the Foothills Belt. The hopes failed to materialize during the year, but at least two structures now under development are regarded as bright 1946 prospects. These are the Brazeau Anticline, a big, deep limestone ridge of the Turner Valley type, located in the Central Foothills; and the Jumping Pound Anticline, a deep limestone ridge 20 miles north of Turner Valley which yielded a "wet gas" discovery in 1944.

Well Completions in Alberta During 1945—Summary of Results:

AREA:	Oil Wells	Gas Wells	Abn'd	Suspended or Testing	Total Wells
Turner Valley	15	..	1	1	17
Pekisko	..	..	1	..	1
Millburn Creek	..	..	1	..	1
Sullivan Creek	..	..	1	..	1
Folding Mountain	..	..	1	..	1
Priddis	..	..	2	..	2
Coalspur	..	..	1	..	1
Jumping Pound	..	..	1	..	1
Alberta Foothills Belt	**15**	..	**9**	**1**	**25**
Conrad	14	..	13	..	27
Taber (West)	4	..	..	..	4
Princess Area	7	4	7	..	18
Medicine Hat	..	6	..	..	6
Bullshead	..	..	1	..	1
Burdett	..	..	2	..	2
Chin Coulee	..	..	2	..	2
Endon	..	..	1	..	1
Foremost	..	..	2	..	2
Grassy Lake	..	..	1	..	1
Hay Lake Dome	1	..	1	..	2
Jenner	..	..	1	..	1
Milk River	..	..	1	..	1
Raymond	..	..	1	..	1
Rainy Hills	..	1	..	..	1
Suffield	..	2	1	..	3
Stirling	..	..	1	..	1
Twin River	..	..	1	..	1
Tempest	..	..	2	..	2
Wrentham	..	..	4	..	4
South Alberta Plains	**26**	**13**	**42**	..	**81**
Lloydminster	5	..	2	2	9
Edgerton	..	..	1	..	1
Innisfree	..	..	2	..	2
Kinsella (NE)	..	2	..	..	2
Kitscoty	..	..	..	1	1
Vale Dome	..	1	1	..	2
Vermilion	..	..	..	1	1
Central Alberta Plains	**5**	**3**	**6**	**4**	**18**
Total Alberta, 1945:	**46**	**16**	**57**	**5**	**124**
Summary of 1944 Results					
Alberta Foothills Belt	39	..	6	..	45
South Alberta Plains	12	4	43	3	62
Central Alberta Plains	20	3	5	5	33
Total Alberta 1944:	**71**	**7**	**54**	**8**	**140**

The Brazeau Anticline, being tested by a syndicate composed of six major and independent companies, rates as one of the brightest "big structure" prospects in Alberta. The 1945 venture, Home-Brazeau Syndicate 1, found the Madison Limestone ridge crest at 9498 feet, within a few feet of pre-drill seismograph-based estimates, but faulted back into younger formations after penetrating only 99 feet of lime. Drilling was continued and in February, 1946, lime was again found at 11,351 feet. The bit faulted back to Blairmore at 11,599 feet and drilling was completed at 11,689 feet.

Slight porosity in the lower lime sliver yielded 50,000 cubic feet daily of gas, with no sign of oil or water. The well was plugged back to the upper lime sliver (to top of which seven-inch casing had been set), and testing was underway in mid-March. This upper sliver, which showed only slight porosity, yielded 800,000 cubic feet of gas plus a good showing of light green crude oil in March testing, and was thereupon treated with 1000 gallons of acid March 20. Before clearing input water and spent acid, the well was closed in for eight hours, building up 3100 pounds on the casing and 1025 pounds on the tubing, indicative of a formation pressure probably over 4000 pounds. Opened, the well cleared itself, and made gas March 22 at 2½ million cubic feet daily, plus some light oil.

After a further acid shot of 4000 gallons last week the well flowed 10½ million cubic feet of wet gas daily against 310 pounds tubing and 660 pounds casing pressure. Bottom-hole pressure was estimated at 4300 pounds.

The 1946 Program

As the 1946 oil and gas exploration program gets under way, in excess of 10 million acres of oil and gas rights are held under lease or reservation in Alberta, the bulk under committments requiring geological, geophysical and/or drilling in the current year.

With the spring thaw will come the end of the current winter slowdown in geophysical work and wildcat drilling, and an exploration program that is expected to compare favorably with that of recent years. Last year failed to fulfill the high hopes held for it, but the Alberta oil and gas industry looks forward with confidence to 1946. This, they feel, may be "the year."

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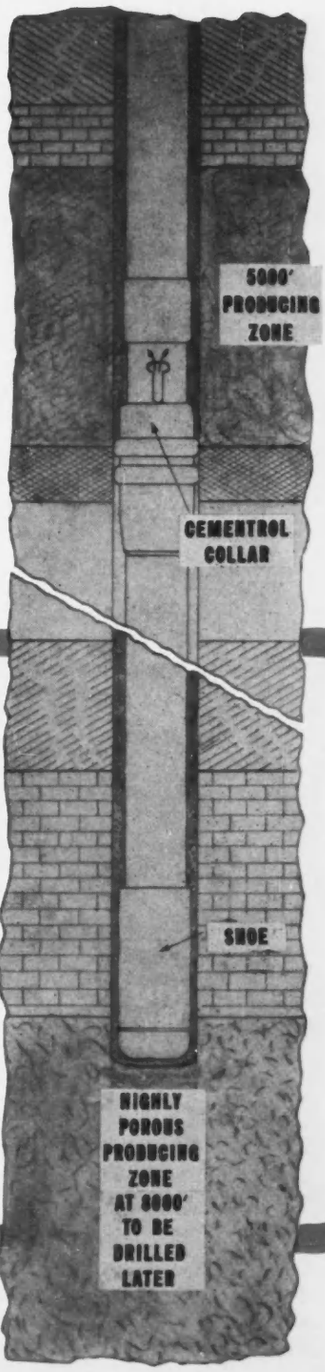
The well contained two producing zones . . . one at 5000' and one at 8000'. Casing was set through the upper zone and on top of the lower zone. The lower zone was of such porous, permeable character that it was merely "scratched" before casing was set and it was drilled in later with clear water.

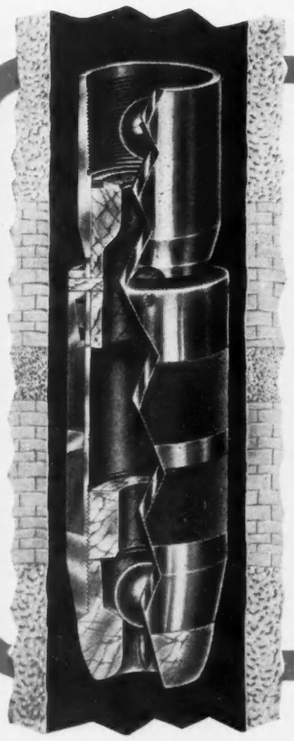
Due to its porosity and permeability, it was desirable, in order to reduce the hydrostatic head and lessen the danger of contamination by mud or cement, to place only a small amount of cement around the casing above the lower zone. This portion of the cement job was done by displacement method through a Larkin Geyser Float Shoe, which provided an even distribution of cement at the casing seat.

The upper cementation was done through a Larkin Cementrol Collar which is operated by pump pressure after a weighted Bakelite Bridging ball has been dropped and has come to rest in the seat of the internal Bakelite sleeve valve within the collar. Pump pressure expands the packer and exposes the side ports through which the upper zone was cemented. The packer relieves the lower section of hole of the weight of the fluid and cement above the packer.

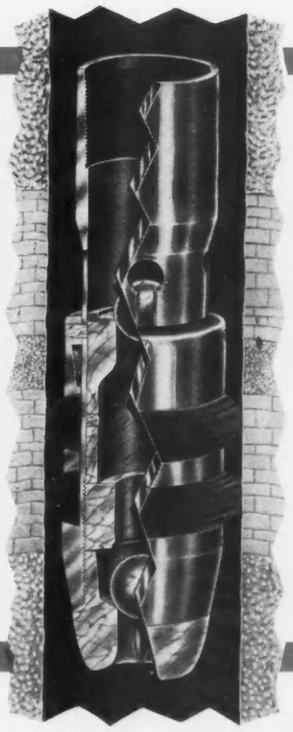
More and more practical uses for Larkin Cementrol equipment are being suggested by operators in oilfields everywhere. Larkin Cementrol Equipment can prove useful . . . and valuable . . . in solving your cementing problems.

Larkin Cementrol Equipment is available through your supply store. Full details of its operation and applications will be gladly furnished on request. Write Larkin Packer Company, Inc., St. Louis.





Cementrol Shoe, running-in position



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*This is No. 6 in a series of cementing problems solved with Larkin Cementrol Equipment. If you'd like full details on other practical Larkin Cementrol solutions to cementing problems, we'll be glad to furnish complete details. Reg. U. S. Pat. Off.

Russia's Oil Grab In Middle Europe

Behind the Red Army's "Iron Curtain," the oil of three nations flows eastward toward Moscow

By HENRY OZANNE, Staff Writer

Geologist O. Skvortsova and Foreman D. Senyuta inspect a new well in the Borislav (former Polish) oil fields.

—Sovfoto

AMERICAN oil interests operating in Central Europe are gravely concerned over increasing indications that Russia will never relinquish control over the producing and refining properties seized as war booty in Roumania, Hungary and Austria. The Soviet Union's economic and political conduct relating to the petroleum resources of this area points to her intention to hold her new "cultural frontier" running right through Middle Europe from the Baltic to the Adriatic Sea. That frontier is what Winston Churchill called Europe's "Iron Curtain," and stretches from Stettin to Trieste.

Russia has consolidated her power to the east of this "wall" by diplomatic and military treaties signed a year ago with Poland, Czechoslovakia, and Yugoslavia. As soon as peace is made with Hungary, Roumania and Bulgaria, similar treaties are expected to be signed with those countries. Meanwhile, the dominant political force in all these nations continues to be Communist party coalitions which strengthen Russian prestige. Already throughout this entire region Russia has stepped in and filled the void caused by the collapse of Nazi power, and has succeeded in dissipating virtually all British and French influence among millions of Europeans.

A clue to Russia's overall policy of domination in Central Europe is found in her handling of oil properties in the occupied lands. Russian reparations officials have dismantled and shipped into the U.S.S.R. huge amounts of oil producing and refining equipment previously belonging to American, British and Dutch companies. The details of this story of spoilation are just now being disclosed with the return to the United States of investigating missions sent into the area for an on-the-ground report of what is taking place in the fields and at the refineries. While the full account is still not available, much is now known that was a secret even six months ago. The following is a review of conditions in three countries of special interest to the American petroleum industry: Roumania, Hungary and Austria.

ROUMANIA

Of the three countries, Roumania is probably the least devastated. And it is, of course, by far the greatest oil producer of the three. Roumanian production was stepped up to around 85,000 barrels a day under German exploitation, and under the Russians is being held to about the same figure. Before the war, German and French interests were strong, and while there is some indication that the French operators will be reinstated, it is clear that Russia considers all the former German properties her own.

All American operations in Roumania are in the hands of the Standard Oil Company (N. J.), operating through its Roumanian subsidiary, Romano Americano. At present, 12 to 15 percent of Roumanian production is American. The reparation terms under the 1945 Armistice computed the Roumania output then at about 30 million barrels a year. Half of this production was to go to Russia without payment. About 10 million barrels were allocated for local consumption, the remaining 5 million barrels, unallocated at first, were virtually confiscated when Russia increased her original demands by another 4 million barrels. Actually, the Russians are reported to have taken 22½ million barrels of oil from Roumania for the year ending September, 1945.

Drilling activity in Roumania is now at the lowest point in 14 years, due to a lack of equipment and to the Russian

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A new well, No. 36, has been brought in for the Stavropol field in the Kuibyshev region. Standing by the well are A. Boltushev, manager of the field, and foreman N. Yudin.

Sovfoto

exploitation policy. The Russians appear bent on overproducing existing fields and wells in contrast with the Germans, who carried on extensive wartime development in Roumania. In fact, German discovery chiefly accounts for the rise of Roumanian production from only 15,000 barrels daily in 1941 to nearly six times that figure when the Russians took over. At present, reports the Roumanian Petroleum Institute, 163,000 tons of equipment are needed for the rehabilitation of the fields and the refineries, mainly for the refineries. In 1939 there were 35 crude oil refineries in Roumania, but 22 of these handled less than 4 percent of the country's total throughput. These large refining installations were the target of Allied bombing raids and the big plants suffered heavily. The fields are still in good condition.

The Russians will complete shortly their new pipe line from the Ploesti fields to Odessa, 250 miles distant. Construction of this carrier is further proof the Russians are looking forward to permanent control of the Roumanian fields.

Russian despoilation in Roumania has centered chiefly on pipe. Millions of dollars worth of pipe has been seized and transported to the U.S.S.R. The reason for such action is still unexplained, especially since American observers recently have found boxcars of pipe still standing on railroad sidings west of the Russian frontier. One possible explanation advanced is that the Russians wish to have the pipe in hand for bargaining purposes when the peace is signed. They could then declare that the pipe could be returned, or could be put over the Russian border in 24 hours.

All in all, Russian domination of the Roumanian oil properties is much milder in form than that exercised in Hungary. In Roumania the Russians have adopted the policy of not interfering with direct operations, but of controling them through the Roumanian puppet government. No Red soldiers, for instance, are stationed at any of the fields, although Russian "expediters" do occupy the company offices through which they direct drilling and refining operations and give orders for shipments to the U.S.S.R. All the companies must submit to these Russian officials their complete program of drilling, production and refining. Generally, the chief difficulty in Roumanis is meeting Russian demands for stepped-up output.

While Russia does not place her military on the oil properties, she has one of her largest armies outside her own territory on Roumanian soil—1 million armed men, a military machine which is seriously disturbing Roumanian economy since these Red troops live off the land.

HUNGARY

In Hungary, a completely different Russian policy is followed. There the Red Army actually occupies the oil fields and plants, and all operations are conducted under a military oil dictator. Each field is "guarded" by a permanent contingent of Red troops, and Red Army officers direct the actual operations. They order the U. S. engineers where to lay pipe, what size beams to run, and supervise every detail.

Russia now maintains an army of 600,000 within Hungary, and these Red troops must live off the land by requisition, forage and loot. Roumania, traditionally known as the land of "milk and honey", has fared much better than Hungary. Hungary, in contrast, is a much poorer land and greatly more devastated. The crushing weight of the Red army is strangling her economy and even threatening her existence.

Production in Hungary now is about 15,000 barrels a day, chiefly through the European Gas & Electric Company, which is owned 91 percent by Standard Oil Company (N. J.). European Gas & Electric, in turn, operates through a wholly-owned subsidiary, the Magyar Ameriki Olijpari, Rt.

Russia is now claiming about 5 million barrels annually from Hungary, the entire oil production of the country, and virtually all concentrated in the Lispe Fields. This production for 1945 is broken down as follows by the three chief fields:

Field	1945 Production (bbls.)	Number of Producing Wells
Budafapuzta	1,540,460	130
Lovaszi	3,122,498	109
Hahot	356,171	29

Estimated reserves for these three fields are Budafapuzta, 16,524,000 bbls.; Lovaszi, 20,823,000 bbls.; Hahot, 6,-203,000 bbls.

Both Budafapuzta and Lovaszi are settled fields and little extension in these reserve figures are expected. Hahot is a relatively new field discovered in 1942 and reserves may or may not be expanded.

American representatives estimate that Hungary's wells are now being overproduced by about 20 to 25 percent, and there have been recent sharp exchanges between Russian and American technologists over current operations. Frank W. Abrams, board chairman of Standard, pointed out at the close of 1945 that Russian methods of increasing production were unsound, such as allowing gas to escape into the air rather than returning it to the underground reservoirs for further energy. Abrams said:

"Oil was produced from wells at Lispe (before the Russian entry) at the highest rates possible without waste."

The Russians appear determined to exploit the field to its maximum without concern for long-range return. They have justified their operations by claiming that American development technique is 25 years behind that of Russia. This statement carried little weight

among the technologists who answered that Russian methods would waste more than half the reserves of the field.

On February 19, 1946, Associated Press Correspondent Jack Gunn wrote from Budapest that the Russians had already "ruined one American oil well." This dispatch was held up by the Russians and Gunn's information was disclosed only by relaying it through another capital. Gunn reported that responsible American informants had told him that "total damages to date from the Russian operation of this American property amounted to roughly $25 million." The correspondent also said the American military mission had sent a note to Marshal Klementi Voroshilov calling attention to the damage.

Gunn's informants in Hungary said Russian production methods had resulted in the waste of 7 million barrels of oil in the last year, and the Russians were "wasting enough gas daily to supply Budapest for a week."

Eugene Holman, president of Standard, commented that Gunn's report "was in accord with information previously received from the company's representatives and with similar press dispatches from Hungary published here in January." He added that the problem had been the subject of discussion with the State Department, although no formal claims were filed.

Since then announcement has been made of the new Russian-Hungarian Oil Company. Formation of this concern was reported in the United States March 5, 1946, and was interpreted in industry circles as a "squeeze play" by Russia. Russian-controlled disclosure of the new company carried the further information that in 1941 Hungary had granted a 40-year, 11,000 square mile concession to the German Winternhall Company. "Under the terms of the Potsdam Agreement, this concession, as a German, asset, becomes a Russian property." The new setup calls for a joint board of three Russians and three Hungarians under a Russian general manager who is the real operating head, and a Hungarian president who has no executive powers. The Russians and Hungarians are to put up equal amounts of drilling and other equipment, or funds for the purchase of such equipment.

American interests are still hard-pressed to learn everything that is occurring on their properties. The "runaround" which the Russians gave the Jersey Standard mission to Hungary is typical of Russian tactics. In October, 1944, when the company wished to send a representative to Hungary to inspect the properties, the Russians engaged in delaying maneuvers. Visas were held up, needed permits failed to arrive. After the U. S. representatives reached Hungary they encountered the same sort of passive resistance. Finally, the Russian officials in Budapest announced that the Standard people needed no permits . . . "the property is yours, you can visit it as you wish". But when the Americans arrived at the fields, minor Russian officials protested no knowledge of such an arrangement and demanded entry permits. By such means the U. S. delegation was held up for months.

Field operations in Hungary are in the hands of men still employed by Standard; but the Russians exercise top-management control through the offices. In both Roumania and Hungary, all the oil goes to the Russians, but in the former country it passes through the intermediary of the Roumanian government. In Hungary, it goes directly to the Russians.

So collapsed is the entire Hungarian economy that Standard's main job in that country is the attempt to provide food for the company workers. Company trucks drive along the countryside to pick up whatever food is available; knicknacks are traded for eggs and vegetables. And there is the ever-present danger of Russian soldiers commandeering every scrap of food that can be procured.

In Hungary even more than in Roumania, the Russians have stripped the properties of installations and moved them back into Russia. Even the present state of damage to the Socony-Vacuum Oil Company refinery in Budapest is unknown.

AUSTRIA

Nowhere more than in Austria is Russia's program of domination more completely revealed. The Russians interpret the Potsdam Agreement as granting them title to all Austrian industries which have headquarters in Vienna, regardless of where the operating properties are located. This, of course, includes the Zistersdorf oil field.

Socony-Vacuum operated jointly with Royal Dutch Shell in Austria, but the prospect for restoration of American property there is even gloomier than elsewhere. When the Nazis seized Austria in 1938 they squeezed out both the American and British interests, and the Russians apparently are making no plans to return the properties to their former owners. The Russians have requisitioned 70,000 acres of Austrian farmland to feed the Red Army and plan to build barracks housing Russian families which will be settled on the land. Further, Moscow has exacted 1,100,000,000 Austrian schillings from the country as "occupation expense" and is now demanding 400 million more as repayment of a "loan" made to the Austrian government—these funds having first been taken from Vienna banks in German marks. The whole deal will give the Russians 60 percent of the currency in the hands of the Austrian public.

The difficulties of American petroleum interests in Austria go back to the time of the Anschluss when the occupying Nazis changed the petroleum laws and abolished the preliminary exploratory period involved in concessions. Socony-Vacuum was then holding a large portion of the Vienna Basin under lease and still hopes to have its former rights restored.

Austrian production is now about 3 million barrels a year, of which half is refined in Austria. All the oil goes to the Russians who are paying for it, but the current basis of payment is not clear even to Socony-Vacuum. Before the war the rate was 100 schillings a ton (about $2.50 a barrel).

Roumanian Parallel

In Austria the Russians exercise generally the same sort of suzerainty as in Roumania. The Socony-Vacuum personnel conducts its own operations, but under a Russian "supervisor" in the offices who instructs as to the production required, the development to be carried out, and where the oil is to be delivered. Refinery operations are directed in the same manner.

The Russians are now allowing Socony-Vacuum a token amount of the refined products for delivery to the company's former customers. Most of this is lubricating oil, very little is gasoline.

In Austria, the Russians have dismantled much field and refinery equipment. This has resulted in a lower productive capacity than the field had during the war under German management. Much of the installation was sabotaged by the Nazis near the end of the war. Other equipment has been removed by the Russians.

All the foregoing indicates that Russian expansionism is on the march throughout Middle Europe, that Russian influence cannot be expected to be withdrawn and that under Russia's aegis the area stands to become an economically self-contained, Moscow dominated bloc. Trade within the region would be among the nations included and between them and Russia itself. Most of the current trade pacts now concluded are on a barter basis and leave nothing for any other customers. The effect of such agreements, as expressed by Dr. Edward S. Mason of Harvard University, former consultant of the State Department's Office of International Trade, is "to channel the whole exports from this area into Russia and to limit such imports into this area as are made available to Russian sources."

The other day at quitting time we received a call for two nozzle-tips for a G. M. 6-71 Diesel engine on a location. The driller said it was an emergency. He had to shut down until he got the parts. In less than ten minutes the parts were in the back of a Stewart & Stevenson delivery truck. Service Manager Fred Mitchell gave the driver directions, and he was on his way. . . . A point to remember next time you need service — or parts. Night or day, rain or shine, call STEWART & STEVENSON SERVICES, Houston.

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Europe Faces Long, Hungry Road to Economic Recovery

By DR. J. BRIAN EBY
Consulting Geologist, Houston

IT IS not often that a factual reporter is given the opportunity to present his personal opinions. Concerning my recent trip to Europe,[1] the unusual circumstances and urgency of the European situation, I have been requested to make some personal observations. Quite naturally any such opinions are entirely my own and do not necessarily reflect either that of THE OIL WEEKLY or of any government agency or personnel.

The most fundamental problems, of course, are those concerned with Allied Policy in Germany, the plans for preventing a reestablishment of German war potential, and the rehabilitation of all the countries of Europe.

It has been pointed out by many observers that the Allied policy of dividing Germany into four subdivisions, while a necessary military measure, does not in the long run work to the advantageous recovery of Europe as a whole. Great Britain and the United States apparently desire that Germany as a nation be kept reasonably intact, whereas the French government is anxious to detach the Ruhr from the German nation for the purpose, as the French put it, of preventing this vast industrial area from ever again being used by the Germans as a center of war industry. The British-American view is that the heavy steel industries can be so curtailed that the nation could not possibly rearm under this curtailment. However, by leaving the main industrial fabric of Germany more or less intact, a reasonable economy can be reestablished in Germany and hence throughout the rest of Europe.

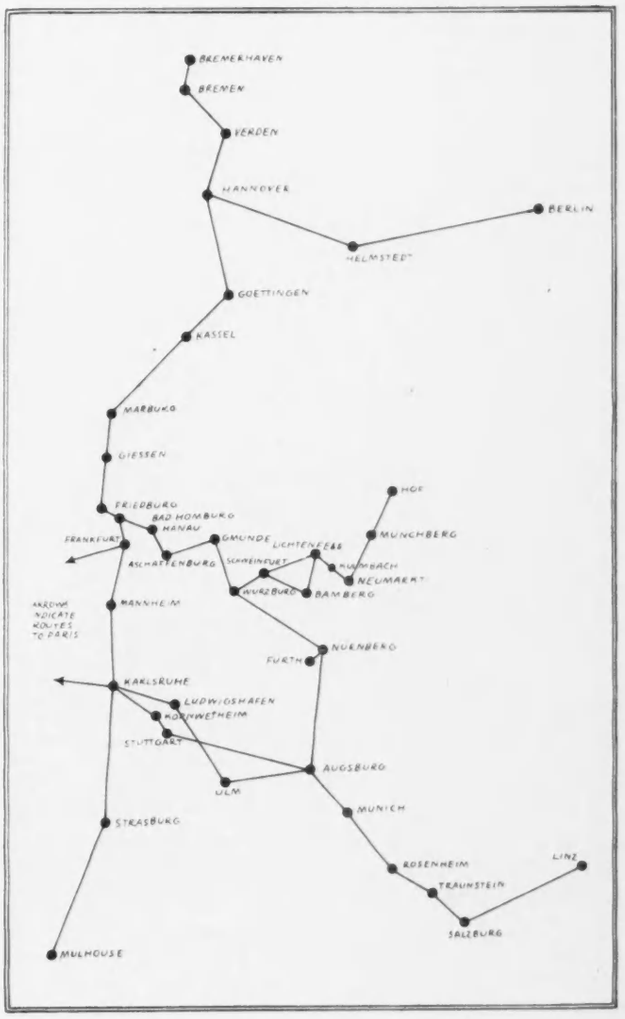
Armament Curb

Just as steps have already been taken by the Allied Control Council to curtail steel, a rigid control of Germany's oil industry would serve further to render impossible any rearmament for wartime usuage, based on the needs of oil and gasoline as demonstrated during the past war. If German synthetic oil and German oil imports are restricted to civilian needs only, it would be impossible to resurrect a war-time machine and keep it rolling. This does not make provision for the prevention of atomic type warfare, although this may better be cared for by the supervision of scientific and industrial establishments.

It will be necessary to reestablish the railroads, canal systems and highway bridges throughout all northern Europe before any hope can be entertained for a reasonable return to normal conditions. The damage done to the transportation systems was unbelievably great. The accompanying sketch shows the only railroads now open to the American Army of Occupation in Germany as of February 1. Most of these lines are single track and operate precariously over temporary wooden bridges and hastily installed signal systems. The lack of rolling stock and locomotives together with the road bed damage makes it extremely difficult to transport coal to the cities for energy and heat and the making of steel, the latter of which is needed desperately to reestablish even the most basic necessities of life.

The problem has the set-up of a vicious circle, any solution of which violates one or more elements of Allied general policy. The handling of the situation therefore becomes one of expediency and good judgment by those in charge in Europe rather than a too rigid application of the so-called "agricultural" policy.

The American government is repre-



German rail lines open to American forces.

—From OMGUS Facts

sented in Berlin by highly qualified and capable military and civilian personnel. General Clay is held in esteem by his co-workers and the same holds true for Brig. Gen. Draper, Chief of the Economic Division. Philip Clover, in charge of the Oil Section, is a man of vast experience in foreign oil work and is handling a difficult job well. As long as the quadripartite system of government in Germany is enforced, we are fortunate to have such men represent the American section.

Some Industry Vital

It is obvious that a minimum reestablishment of German industry must be allowed. Not only can the population of Germany not exist on what might be produced on German soil but the economy of Denmark, Holland, France and England has long depended on a well-developed industrial Germany.

While I have no knowledge of what the future disposition of Germany will be, in my opinion, it will not be necessary to maintain a large army of occupation on the part of any one or all of the Allies combined, provided the policy of a limited and supervised industry is soon established. It has been hinted that even the Russians are considering the gradual transfer of their supervision from military to civilian personnel.

In Berlin the Russians have reopened more hospitals and schools than in the other Allied occupied zones of the city. They are treating the Germans with firmness but with far more consideration than the Germans treated the citizens of Russian cities during the war. I believe the Russians are definitely making an effort to win a large part of the German civilian population to their way of thinking and perhaps system of government.

In order to preserve the basic health of countries of northern Europe, including England, it will be necessary to import large quantities of food stuffs and necessary articles of clothing and eventually home rebuilding. Much, if not most of this imported material into northern Europe, will have to come from the United States and Canada. It is not a question of humaneness, relief, or sympathy, but a straightforward policy of helping to set the world straight so that the economy of the world as a whole can be placed again on the basis of free and fair trade. As long as Europe and England are in the shape they are in at this time, I see no possibility of recovery within a matter of two or more years.

Sooner or later the Allied governments must make a definite decision as to what to do with Germany. I do not believe that the Allied governments will release their supervision of Germany short of 25 or 50 years. To do so sooner would be dangerous, as it would take from one to two generations of newly educated Germans to wipe out the vestiges of militarism. It would appear that the large armies of occupation will be materially reduced within 12 months, but a large and mobile police force may have to be kept on for two or more decades to enforce the civilian arm of supervision.

As has been pointed out in the public press, the immediate problem is one of food and clothes with the former being predominant at this moment. As the Germans are a conquered and occupied nation and as such are practically the wards of the Allies, their food problems must be solved along with that of our friendly and Allied countries. It so happens that German prisoners of war in Germany in some cases, fare better in food, clothing and housing than many elements of our friendly civilian populations. This naturally engenders much bitterness all around but the situation is slowly correcting itself.

The food and clothing situation in England nearly 12 months after the war is a desperate and dismal problem. The facts of the British situation, the average citizen's philosophy of it, and an earnest plea for correction and improvement of this situation is clearly set forth in the following paragraphs which are taken from a London letter acknowledging receipt of an American parcel:

"It was so very nice to have something that is not "austerity." I know we British "can take it," and *I certainly would not* have things any other way if it is our only means of regaining our proper economic standing in the world, but I still can't help having, what I hope and believe is just a human failing, a great desire for nice things. I am *so* sick of all our "dowdiness"—the few spots of Spring sunshine which have appeared bring it so much to one's notice. I sometimes, in fact often, wonder if our government has the right approach—English people, or rather, British people, in my feeling, never have and never will approach the state of being automatons, and if only they would let us regain our individualism, abolish all this form-filling, austerity, queuing. The other day I stood for ¼ hour in the snow to purchase one pound of fish roe —I think that is wrong, and with proper business management instead of form-filling government control it would not be necessary. It is all a most frightful waste of time and morale.

"I believe always in starting from the botom of trouble to find a remedy for it—there is an old adage about charity beginning at home—this could easily be changed into prosperity begins at home—I believe that if homes are happy, then the people in them, who after all constitute the country, will have something to work for where they will see the benefits, and they will work. There is no desire in this country at the moment for laziness, we want to get on with the job of Peace, we have worked, and will work hard for it, but everything is controlled by forms, red tape, forms and then more red tape, and so many of these things seem only to need a little business foresight. I don't see how such a tremendous thing as the welfare and running of a country can be entirely controlled by one comparatively small body, it isn't logical to me.

"I don't pretend to know anything about economics, but I honestly believe that economics should not always be hard statistics—statistics and the human element do not always see eye to eye, and after all, we are human beings and feelings should be considered. Do you know, except for one shipment of bananas which are rightly being kept for the children, there is not one single fruit to be had out of the black market, and yet the other day, in Oxford Street, there was a barrow with lots of apples with a price marked up (quite openly) that was three times the controlled price and yet the policeman could do nothing about it—he had to refer it to one body and they to another and so on—so such things as this thrive.

"The big hotels can all serve quite a decent meal, but the ordinary man, whom this government pretends to serve, just has to go entirely without the smallest luxury, because he can't afford to eat in hotels and to pay black market prices for apples. This may seem trivial to you, but we have been entirely without these things for six years, and we expected something different,—not a complete return to prewar conditions, but at least a little recompense for having said 'boo' to Hitler's secret weapons. Those of us who have little or no faith in our present government, put the blame on them,—poor dears, it probably isn't their fault at all.

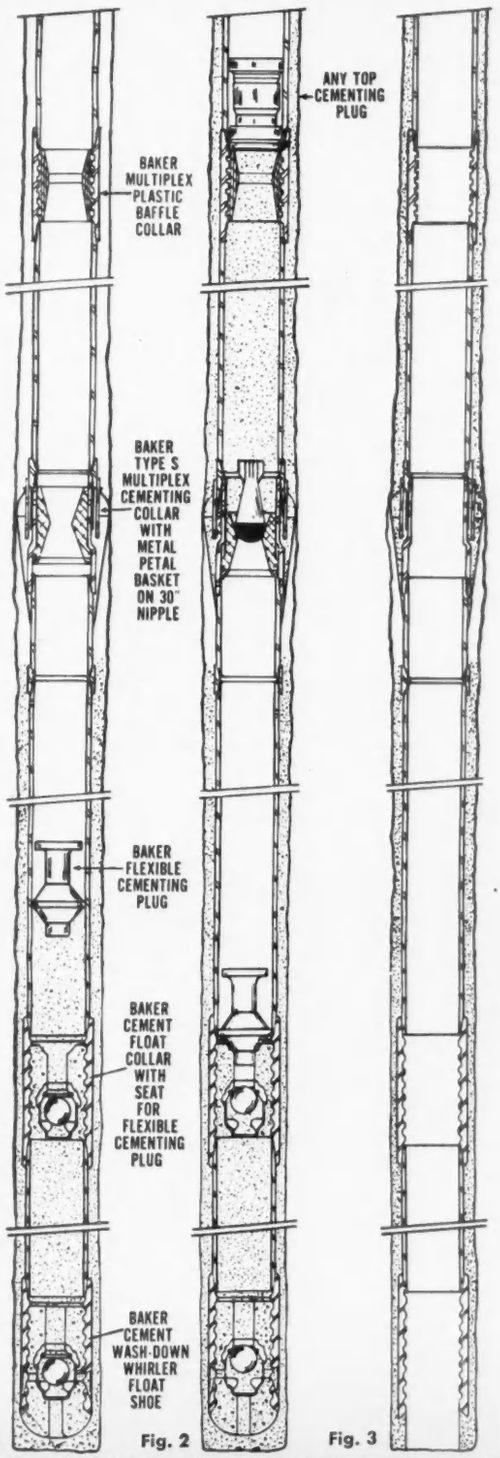
"Seeing that there is a world shortage of food, we should not grumble—actually we take it extremely well—we are certainly a long, long ways from starving, but we're just dog-gone bored with the whole set-up. We'd like an occasional apple or a grapefruit (haven't even seen one for four years) maybe a juicy steak thrown in, and perhaps more important to some of us, some nice clothes, shoes and stockings to make us feel like a million dollars—gosh I can do twice as much work when I feel that way. One thing is certain, I'm not a betting person, but I'd lay a billion to one we'll survive, and boy, will we show 'em!! You might feel this is contradictory in view of all the things I have said, but the British reach a certain point, and boy, do they get cross, and something will be done about it when we've got our temper up—trouble is, it takes a goodly time."

I take this letter as both a compliment and a challenge to the British people. It expresses their sincere and grim determination to see the job through but it likewise sets forth clearly the immediate needs of the common man and the demand on the British government for a fulfillment of these most elementary needs.

[1] THE OIL WEEKLY, December 3, 1945; January 7, 1946; February 4, 1946.

STAGE CEMENTING JOBS

HERE'S HOW TO DO A TWO-STAGE CEMENTING JOB—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BAKER CEMENT FLOAT COLLAR WITH SEAT FOR FLEXIBLE CEMENTING PLUG
BAKER CEMENT WASH-DOWN WHIRLER FLOAT SHOE

Fig. 1 Fig. 2 Fig. 3

The casing, with collars positioned at the desired points, is made up and run into the hole. Circulation is established by pumping fluid into the casing and out through the float shoe. Cement for the first stage (at the shoe) is then pumped in followed by the Flexible Plug which comes to rest on the tapered seat of the Float Collar and thus retains any contaminated cement slurry inside the casing. See Fig. 1 at left.

Immediately following this first-stage job, the Trip Bob is dropped down the casing and allowed to gravitate to its seat in the inner sleeve of the Multiplex Cementing Collar. The Trip Bob must not be pumped down. Sufficient pressure is then applied to the fluid in the casing which shears the screws holding the inner sleeve in the collar and slides this sleeve (with Trip Bob seated upon it) downward until it is stopped by the shoulder formed by the pin end of the casing.

This uncovers the cementing ports in the Multiplex Collar and the Resilient Sleeve permits passage of the cement slurry into the annulus between the casing and the open hole. The Trip Bob prevents downward passage of the slurry and the Metal Petal Basket retains uncontaminated cement above the Multiplex Collar, thus leaving the first-stage job (below) undisturbed. See Fig. 2.

When the cement has set in both the first-stage and the second-stage jobs, all the internal mechanisms, including the Trip Bob and flexible plug in the casing string, can be easily drilled out—as shown in Fig. 3.

This is a BAKER Cement Float Collar with Seat for Flexible Cementing Plug (Product No. 101-A) which is positioned a joint or two above the shoe. By stopping the Flexible Plug at this collar (see Fig. 2) no contaminated cement slurry passes through the shoe.

This is a BAKER Cement Wash-Down Whirler Float Shoe (Product No. 120) which helps, while running-in, to remove bridges and permits proper conditioning of the hole. When the first-stage is being cemented the whirler ports impart a whirling action to the slurry to better fill the annulus between casing and formation, with minimum chances for channeling.

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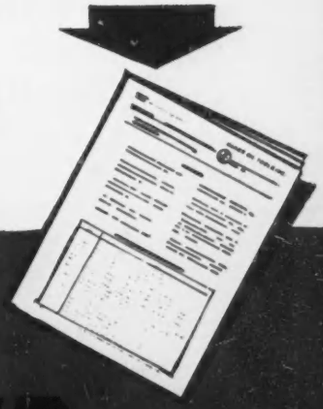

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OSVALDO WENZEL | LUCIANO CLAUDE | EDUARDO SIMIAN | JORGE PACHECO

Claude is chief of the Department of Fuels. Graduated as civil engineer from the University of Chile in 1926. Engineer in charge of the San Antonio Harbor 1920-1927, and the Valdivia River Port Improvement, 1928-1939. Joined Fomento as Assistant Chief, Department of Fuels, January, 1940, becoming chief on January 1, 1944. In this capacity he has been largely responsible for directing the geological and Geophysical exploratory work in Magellanes, and is now in direct charge of the drilling operations for Fomento.

Simian is head of operations. Graduated from the University of Chile in 1938 with degree of mining engineer. In 1938-1939 he was in the geological division of the Department of Mines. In 1940 he was administrator of the Polpaico Lime Plant. In 1940-1942 he was back with the Department of Mines except for a brief period during which he was employed in Louisiana by the Carter Oil Company. Since 1943 he has been connected with petroleum exploration in Magellanes for the Compania de Fomento de la Produccion.

Pacheco is assistant head of operations. Graduated from the School of Mining Engineering of the University of Chile in 1932 and for ten years was employed by the Department of Mines, first in the mining districts of Northern Chile and later in the petroleum exploration in Magellanes, continuing there since 1943 on behalf of the Compania de Fomento de la Produccion. His work for the Chilean government was interrupted for six months in 1940 by a study of drilling operations of Argentina's YPF and in 1944 when he worked in West Texas for the George P. Livermore Corporation, now drilling contractors for the Chilean government.

Wenzel is head of the geological section. Graduated from the School of Mining Engineering of the University of Chile in 1935. From 1936 to 1942 he was employed by the Department of Mines on various geological and economic studies concerning coal and oil, having spent some time in 1939 studying the oil fields of Northwestern Peru for the Chilean government. Since 1943 he has been with the Fomento.

Chilean Oil Developments

APART from the intense enthusiasm of all Chilean citizens over the entry of their country into the ranks of oil producing nations, the government officials directly responsible for the successful completion—as well as their American consultants in the petroleum explorations—are especially encouraged by the fact that the Spring Hill structure was not considered their best prospect on Isla Grande, Tierra del Fuego. Swan Lake, a structure about 50 miles southeast, and close to the Argentina border, is considered a better prospect, but Spring Hill was the more accessible location and hence was selected for the first test.

Late last month the Spring Hill 2 was drilling ahead somewhere below 3050 feet with no reports being received on the purely routine aspects of the drilling. It likely will be completed near the end of April.

Meanwhile the discovery well is still an unknown quantity, since there is no storage facility on the ground and no other outlet for the oil. So it has not yet been tested, beyond the fact that it apparently is a producer.

The Mina Rica structure on the mainland (Brunswick Peninsula) a short distance northwest of the city of Punta Arenas, was not deemed the most favorable prospect of the group of structures worked out in that vicinity. It was the most accessible location among those prospects and the big spudder was started there. It was more in the nature of a geological structure test than anything else, according to Chilean authorities in New York, although there were some slight showings found in drilling it to the shallow depth of 1880 feet where it was abandoned as dry.

The cable tools used on the Mina Rica test are now being used to drill the Picket 1, on Brunswick Peninsula, about 9 miles north of the Mina Rica structure. This new test now is near its projected depth of 2500 feet.

George P. Livermore, Inc., of Lubbock, Texas, is the drilling contractor on both the Picket 1 and Spring Hill 2.

The original exploration program called for a test of the Swan Lake prospect after the Spring Hill test was drilled, and after suitable roads had been constructed for moving in the drilling equipment, but the successful completion of Spring Hill 1 caused the operator (the Chilean Government's wholly owned development corporation, Compañia de Fomento de la Producción) to move the heavy rotary rig from the discovery well to Spring Hill 2, ½ mile north, as reported in THE OIL WEEKLY for Feb. 18. If additional drilling rigs can be obtained, the Swan Lake structure may be tested later this year.

Accompanying are photographs of some of the men principally responsible for the successes so far achieved by the Chilean government in its petroleum exploration.

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When used as the sole drilling control unit, O-C-T Blowout Preventers can be relied upon to effect a pressure-tight seal around pipe in the hole. As an auxiliary control unit above ram type blowout preventers they provide a dependable secondary seal and relieve the ram packers of wear while pipe is worked to prevent sticking. Stripper type packoffs are interchangeable with the regular type packoff to permit running tubing and casing under pressure. Complete mechanical details are carried in the Composite Catalog of Oilfield and Pipeline Equipment, or descriptive literature will be sent on request.

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Nationalization Trend Affecting Oil Industry

One of the aftermaths of World War II is the definite trend toward nationalization of industry, including the petroleum industry.

Industry was aware of this situation before the outbreak of the war but it was only after the Labor Party's election victory in England on a platform of nationalization of industry and the spread of Russian influence that the trend was given new life. Today the "fire" has spread rapidly over most of the small countries of Europe.

The petroleum industry was nationalized in several other nations before World War II, notably Russia, Mexico and Argentina.

There are various degrees in which an industry, once nationalized, is operated. In some countries, like Mexico and Bolivia, the government controls all oil and a nationalized company is the operator.

Argentina closed the door to private companies more than 10 years ago, with companies already on the ground being allowed to stay and operate their properties but were not allowed to expand. The Argentine government controls two thirds of the nation's oil production.

Under the new setup in England, the nation owns the minerals but exploitation for oil and gas is carried on through the granting of licenses to private firms.

Taking their cue from England's Labor Party, other European countries are now in the process of nationalizing industry. In some instances, reports from the various countries do not specifically include petroleum as one of the industries to be nationalized but these reports do list "mining" which is assumed to cover the production of oil and gas.

"State Economic Sphere"

Hopes which might have existed abroad that in spite of the nationalization of Italian assets in the Albanian oil industry private enterprise would become active in oil deposits or the refining industry in Albania were given a setback in an article by the Albanian Minister of Justice, Dr. Manol Konomi, appearing in a January issue of the Tirana paper *Bashkimi*.

"No natural resources can be left to the jurisdiction of private enterprise, because these directly come within the State economic sphere," Dr. Konomi wrote. "The people's wealth cannot pass, as in the past, into private hands. In accordance with this principle, the Anti-Fascist Council has issued laws nationalizing mines, forests, water, etc. In fact, the nationalization of everything connected with the life of the people is indispensable."

Poland is another nation where the oil industry is among industries being nationalized.

The *Petroleum Times*, published in London, in its publication of February 2, 1946, reported that following the protest lodged with the Polish government by the United States Ambassador to Poland regarding the nationalization of key industries, including petroleum, the Polish government on January 18 informed the U. S. State Department that American capital will be "generously compensated" for any harm caused to it by Poland's nationalization program.

The extent of Poland's nationalization program was made known over the Warsaw radio on January 21 by M. Leon Sobocinski (unidentified).

"Under the new (nationalization) law, all enterprises are subject to nationalization if employing more than 50 or more workers per shift," Sobocinski declared. He also mentioned that an amendment to raise the number to 100 was rejected at the time.

Report from Czechoslovakia

Meantime, Prague radio recently announced that the Czechoslovak *Official Gazette* of January 26 contained a list of nationalized industrial concerns in Czechoslovakia.

"Among the firms well known to the public are: Appollo-Nafta, Benzin-Benzol, the Fanto Works, Vacuum Oil Company, and Mineral Oil Works of Privoz," the radio said.

It is evident from this brief announcement that much of the petroleum industry in Czechoslovakia has been nationalized.

All Hungarian "mines for minerals" have been brought under State control as from January 1, according to a cabinet decision dealing with the nationalization of the mining industry, the *Petroleum Times* further reports. No indication is yet available whether this includes petroleum.

Press reports from Paris say that President Felix Gouin of France, newly elected Socialist chief of state, has called for a vast, expanded program of nationalization, including electricity and gas, "certain large business banks, certain insurance and mining companies, river and canal transportation" and part of the merchant navy.

(Washington [THE OIL WEEKLY, March 4] thought there was little prospect that any French nationalization program would extend to petroleum, inasmuch as domestic production is slight and the nation is dependent upon imports.)

Also expropriation of petroleum properties in Croatia apparently is going forward. In an article written for the *Daily Telegraph*, London, Randolph Churchill declared:

Jugoslav Policy

"The British Shell Company, who owns refineries and pumps in Croatia, have been trying for four months to obtain an entry permit for their representative to inspect their property. This has been steadily refused by the Jugoslav authorities."

Churchill was commenting on the policy of hostility equally directed against all British and American businesses that own property and factories in Jugoslav.

"Now the Belgrade Court," Churchill wrote, "have pronounced that this property belongs to the state on grounds that it has been 'abandoned' by its former owners."

With the trend toward nationalization of the petroleum industry in Europe fast taking shape, oil executives now are wondering if concerted action will be taken by the Chinese government in this direction.

Thorny problems relating to private operation of the oil industry in Hungary and Roumania continue to arise.

Although faced with nationalization of the industry in most of the Balkans, so far, none of the oil companies—Standard of New Jersey, Socony-Vacuum, and Shell—have been dispossessed in Roumania. In Hungary the wells of Standard's subsidiary are being operated by the Russians.

Commenting on the Hungarian situation, the *Wall Street Journal* recently said that huge production quotas, considered unreasonable by the State Department, were set by the Russians, and when the company failed to meet them the Russians moved in. However, the company still owns and nominally operates the property.

In the Balkan nations, the New York paper says, American oil companies, if they hang on and continue to operate, face competition from larger nationalized producers. If they are forced out, the State Department will have more compensation worries.

Debate Over Concession Where New Czechoslovakia Producer Is Located

American-owned companies with investments in oil lands and installations in Czechoslovakia have made formal claims for recovery, but the government's attitude toward all industry leaves considerable doubt that any claims will be honored which deal with subsurface rights.

In fact the nationalization decree issued shortly before the first of the year specifically states that no payment will be made for any subsurface rights. Title to any products underground has always been vested in the government but foreign interests claim some compensation for having actually discovered oil and reduced it to possession in the form of producible reserves. Another contention is understood to be that although the Czechs had actually agreed to grant certain concessions on which oil has now been discovered, the actual granting had been under the auspices of the Germans after the occupation.

A field discovered in 1945 near the town of Zizkov, just north of Lundenburg (or Berclava) in Moravia apparently is the first oil production in the country which potentially might fill any substantial portion of the national demand. (In a normal prewar year this was about 500,000 tons, or roughly 3,500,000 barrels.) Heretofore this demand has been filled by purchases from Roumania with some purchase of special products, such as lubricating oil, from other sources.

Very little information is available on the character of the new field beyond the fact that, as an extension into Czechoslovakia of Austria's Vienna Basin area in which are located the Zisterdorf fields, it is supposed to be of the same type, and more or less a typical Middle European fields. It is very good by those standards. On the basis of only four wells completed to date, reserve is said to be estimated at 7,000,000 barrels or more. Further development may increase this figure.

The concession itself has been a source of discussion between the government and foreign interests, since agreement had been reached on the terms of a contract to grant a 200-square-kilometer area to an American-owned company before the occupation by the Germans. Although the Germans did not block the action completely, they insisted that German companies be given a large portion of the interest in the project, and as finally executed under German auspices, the operating syndicate allowed a 40 percent interest to Vacuum Oil Company and the remaining 60 percent was divided among four German companies, each with a 15 percent interest. There seems to be a disposition on the part of the Czechs to void the contract on the grounds that it was negotiated by an invading nation which had no rights within their boundaries. However, this might be for the purpose of removing the German interest from the picture.

Gasoline Plant Seen As A Possibility in Alberta

Construction of a $25 million plant in the northern Alberta area to extract gasoline from natural gas may be undertaken, according to government officials who point out that applications already filed for several million acres for oil exploration, plus more than 4.5 million acres already under leases by major oil companies in that area.

Imperial Oil Company has attracted much interest by its development work in the Kinsella field where a number of gas wells are already reported. This company is exploring one of the largest reserves on the plains, an area extending from Innisfree on the north to the south of Hardisty and from 2 miles west of Viling to one mile west of Wainwright.

An area comprising 195,949 acres between Nanton and Vulcan has been granted Shell Oil Company of Canada, Ltd., which plans exploration work.

Other areas of significant gas reserves are the Princess-Steveville-Denhart regions and the large Medicine Hat-Redcliff gas field.

Current Activity Reported In New Polish Fields

Poland is exploiting new oil fields to augment present annual production of about 120,000 tons (about 890,280 barrels) derived from 30 percent of prewar oil producing facilities, according to the Polish press. Ten new wells are being drilled near Cracow, in Pomerania, in the Poznan area, and in Kiezeckie, the reports said.

Arabian American Output Doubled in Year's Time

Crude oil production of Arabian American Oil Company, owned jointly by The Texas Company and Standard Oil Company of California, in 1945, totaled approximately 21,300,000 barrels, a daily average of 58,400 barrels. The company's production is in Saudi Arabia.

The output compares with 7,800,000 barrels in 1944, an average of 21,400 barrels per day, Texaco's annual report reveals. Daily crude production at the close of 1945 was about 83,000 barrels, as compared with 40,000 barrels at the close of 1944.

The company's new refinery built at Ras Tanura on the Persian Gulf, constructed in 1945, was placed in part operation in October, 1945, and was completed in December, 1945. As of December 31, 1945, this refinery was running approximately 60,000 barrels of crude oil daily.

The company also reported that additional gathering lines and a main trunk line from the Abqaiq producing area to the Ras Tanura refinery will be completed early in 1946. This will insure an adequate supply of crude oil for refinery running and for offshore shipments.

Deep Test in Denmark Seen Likely Before 1947

Danish American Prospecting Company (Gulf Oil Corporation) is getting its exploratory efforts in Denmark underway again. The company hopes to have a core-drilling crew, a seismic crew and a gravity crew in operation soon, and may commence drilling of a deep test before the end of the year.

The company has an exclusive concession on the entire country. The company's operations were commenced in 1938, but were interrupted by the German invasion of Denmark in April, 1940.

Tankers For Sale

Seven partly completed T1-M-BT1 tankers have been offered for sale by the U. S. Martime Commission, which will open bids April 18.

The vessels will be offered for sale either for use for commercial operation, under which condition no bid of less than $300,000 per vessel will be considered, or for scrapping. Foreign as well as American citizens may bid on the tankers for completion and use, but only United States citizens may bid on them for scrapping.

Consolidada Pressure-Maintenance Program Due to Be Completed Soon

The annual report of Venezuelan Petroleum Company, whose operating subsidiary in Venezuela is Compania Consolidada de Petroleo, indicates an aggressive and well-rounded program of exploration and development there.

Starting the year with seven rigs running, additional strings were assembled and placed in operation until during most of the year 13 rigs were kept busy, and on December 31 last there were 10 rigs actively drilling. Results showed 66 wells drilled of which 64 were producers, all in the Santa Barbara and Muri fields in the state of Monagas. The company's crude oil production during the year was 10,541,506 barrels, of which 97 percent was sold to Sinclair Refining Company for shipment to the United States. In addition the company purchased from other producers, nearly 9 million barrels which was moved with its own crude to Puerto de la Cruz through its pipe line from the Santa Barbara area. The pipe line which had a capacity of 52,000 barrels daily at the beginning of 1945, operating with only one pump station, located at Santa Barbara, has increased capacity to 75,000 barrels daily through completion of a new intermediate pump station about halfway from Santa Barbara to the coast. The storage capacity at the terminal was increased during the year with addition of three new 80,000-barrel storage tanks, bringing total tankage to 640,000 barrels. This is in addition to 480,000 barrels of tank capacity at fields and pump stations.

Two geophysical parties were kept busy throughout the year, doing preliminary and detail work on exploration and exploitation concessions held in Venezuela, most of the work having been done on the 162,506 acres held in Monagas. The company holds concessions amounting to 427,103 acres in Barinas, and 182,440 acres in Apure.

Field studies in the Santa Barbara and Muri areas, where the company has been operating long enough to have gathered valuable data, indicated advisability of instituting a pressure-maintenance program, and construction was started last year on a plant with facilities for stripping the casinghead gas, re-compressing, and returning to the reservoir. This project was scheduled for completion about the middle of 1946, and will call for additional capital expenditure in Venezuela during the year, over and above the $10,600,000 addition to capital assets made during 1945.

The effects of the governmental decree calling for an excess profits tax on profits for the year 1945 and payable in 1946, is shown in the fact that, with a net income of the year of $4,408,785 after deducting regular taxes, the excess profits tax for 1945 amounts to $940,776, leaving an actual net income of $3,468,009 for the year. Total fixed capital assets are shown as $31,885,398, after deductions for depreciation and depletion.

Filven Producer in Venezuela Wildcat

Phillips Petroleum Company has announced a major oil discovery on its 25,000-acre Filven Travieso block in the state of Monagas in Eastern Venezuela.

The company's F. T. 1, wildcat located in the northwest portion of the block topped the La Pica sand (Miocene) at 4675 feet and had cored more than 90 feet of soft, friable, saturated pay sand with only five one-foot shale intervals interspersed in the zone.

Company officials believe the wildcat will open an important new oil reserve and plan to feel their way deeper and then set pipe for a production test. It is the first wildcat to be drilled in Venezuela by its wholly-owned subsidiary, Phillips Venezuelan Oil Company, known in Venezuela as "Filven." The company has been doing exploratory work for about a year and holds exploration and development rights on four other blocks totaling 869,603 acres.

Barco Production

Colombian Petroleum Company and South American Gulf Oil Company have reported that production on the Barco concession averaged approximately 15,000 barrels daily in 1945, compared with a daily average of 13,000 barrels in 1944.

Decline Noted in Year's Production in Ecuador

Production of crude oil in Ecuador during 1945 amounted to 2,622,724 barrels, a decline of more than 9 percent from the 2,892,188 barrels produced during 1944, according to the *Foreign Commerce Weekly*.

During 1945, 2,475,113,000 cubic feet of natural gas were treated, resulting in a net production of 41,768 barrels of gasoline. In 1944, the output of gasoline from 2,273,519,000 cubic feet of natural gas amounted to 38,408 barrels.

Ecuador's refinery operations showed an increased output of gasoline, kerosine, diesel oil, and gas oil during 1945, but production of lubricating oil declined. Ecuador's output of petroleum products in 1944 and 1945 is shown in barrels as follows:

PRODUCT—	1944	1945
Gasoline	212,731	225,984
Benzine	4,523	
Kerosine	58,756	71,670
Diesel oil	107,161	133,100
Gas oil	1,227	1,268
Lubricating oil	3,844	1,790
Residue	569,131	464,985
Slops	3,842	13,535
Tar		55
Loss		2,346
Total	961,215	914,733

Three Fields in Mexico Show Decline in January

Petroleum production in the Poza Rica, Naranjos and Panuco fields of Mexico during January, 1946, totaled 3,037,724 barrels, averaging 97,991 barrels daily, which was a decline of 3904 barrels from the daily average during December, 1945, according to the *Foreign Commerce Weekly*.

Stocks in the fields and at the terminals in the northern zone totaled 3,992,929 barrels on January 31, 1946, compared with 3,759,758 barrels on December 31, 1945. January 31, stocks were distributed as follows: 1,948,287 barrels in the Poza Rica field, 887,212 barrels in the Naranjos field, and 1,157,430 barrels in the Panuco field.

Argentina Gas and Natural Gasoline Decline

Production of natural gas in Argentina during the first nine months of 1945 totaled 16,649,000,000 cubic feet or 6.9 percent less than the output during the same period of 1944, according to the Department of Commerce. The output of natural gasoline, amounting to 58,818 barrels, showed a decline of 15.6 percent.

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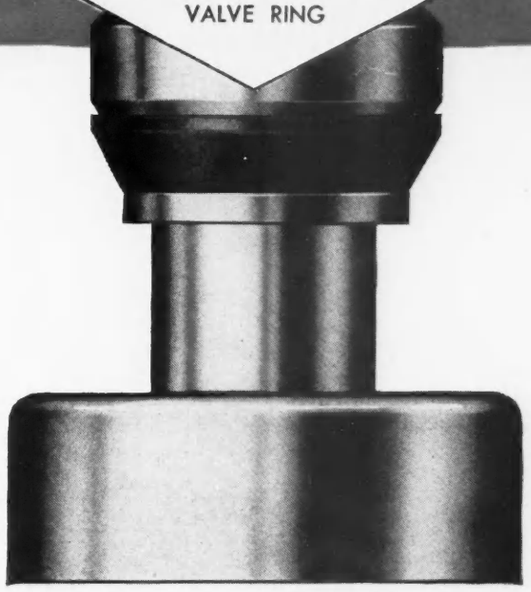

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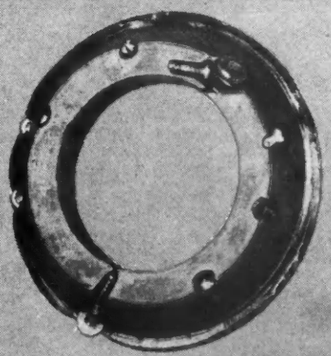

This Valve Ring has been set five different times with objects that would normally prevent a metal to metal seal. It held against 4500 P.S.I. at 300° F. without evidence of impending failure.

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Russian Oil Reserves Believed Upped Some 50 Percent Over 1938 Figure

Russia is in need of large quantities of both production and refinery equipment, and looks to this country for the bulk of its supplies, but the two major factors in the situation are (1) the availability here of equipment for export and (2) finances.

With respect to availability, much of the equipment which Russia will require takes considerable time for manufacture, and at the present time there is no great inventory from which it could be withdrawn. However, once conditions are ironed out here, output quickly may increase to the point where large foreign orders could begin to be filled.

So far as finances are concerned, Russia by reason of the loss of foreign markets during the war, has little dollar exchange. Prewar, her exports brought in some $500 million a year, of which anywhere from $200-$400 million, and closer to the latter, were spent here.

However, discussions are getting under way for a $1 billion loan by the Export-Import Bank, and this probably will be followed by another loan by the International Bank when it gets under way the end of this year.

Trade with Russia also may be discussed at the 15-country international conference to be held this fall, at which new reciprocal trade agreements with the other 14 countries will be initially negotiated. Russia has been invited to participate in this meeting, but has not yet accepted.

Petroleum equipment is one of the two or three most important items on Russia's shopping list. There is no reason to expect any break in friendly commercial relations because of her maneuvers in Iran and elsewhere. She has always been a good customer of the United States, particularly in the equipment field, and has always met her obligations in full and on time.

Russia is believed to have increased her discovered oil reserves by anywhere up to 50 percent since 1938, the last year for which complete information is available, and her equipment and machinery requirements are seen as spreading over a number of years to come.

Oil Nationalization Trend Reported By Socony-Vacuum

Comments on developments in South America and Europe were made in the recently issued annual report of Socony-Vacuum Oil Company and subsidiaries. Average daily production by affiliated companies in Venezuela is 16,000 barrels and in Columbia 7600 daily, while 9000 barrels daily are being received from Iraq, the company reported.

Political and economic conditions throughout large areas in Europe were described as generally unfavorable. "The economic disorder and impoverishment resulting from long years of occupation and war have led to the adoption by governments of arbitrary economic policies which tend to place an increasing share of economic life under operation by the state and to control or displace individual enterprise.

"In Czechoslovakia, Poland, and Jugoslavia, countries which are members of the United Nations functioning under their own governments, the oil industry has been nationalized or a government monopoly has been established.

"The future course of our business in all these areas will depend largely on local political and social-economic develompents."

Geological and Geophysical Work in New Guinea Planned

With government restrictions on the search for oil in New Guinea lifted, Australian Petroleum Company will proceed with geological and geophysical work. The company also plans immediate drilling operations.

Expenditures for the company during 1946 are budgeted at $650,000. When the Japs arrived in 1942, the company had reached a depth exceeding 5000 feet in its first test at Kariava.

BEA Resumes Services

The British Engineers Association, national association of engineering manufacturers in the United Kingdom, with headquarters in London, has anounced resumption of prewar services after an interval during the war years. Enrollment on the BEA-Register affords the opportunity of keeping in contact with progressive British commercial engineering practice, the association's director, A. W. Berry, announced. The association's address is 32 Victoria Street, London, S. W. I.

Mendoza on Inspection

Felix Mendoza, with the Colombian Department of Petroleum, is in Houston making an inspection tour of South Texas oil fields. Mendoza recently completed a two-years' postgraduate course in advance petroleum engineering and petroleum economics at the University of California. About six years ago, he received his petroleum engineering degree from the University of Oklahoma. Mendoza has served as chief petroleum engineer and chief of the economics division of the Colombian Department of Petroleum. Mendoza attended the well logging "refresher" course held recently at the Texas A. & M. College.

Felix Mendoza

Paul Courtney, Emsco Derrick & Equipment Company, Houston, left March 28 for a six week trip to Venezuela.

Standard of California's Colombia Test Progresses

Standard Oil Company of California's Caraballo 1, initial test in the middle of Magdalena Valley of Colombia, is drilling below 5550 feet with probability that it will be carried to 12,000 feet. The test, spudded on September 23, 1945, is located on the 642,000-acre Arroyo Caraballo concession, 50 miles northeast of Baranquilla.

Progress of this test was announced by F. G. Follis, president of Standard of California, and while no forecast was made or details of formation penetrated released, Standard is looking to the test hopefully. Tropical Oil Company and Colombian Petroleum Company both have production, now running 70,000 barrels daily in aggregate, in the middle Magdalena area and Shell Oil Company recently obtained production on its Casabe field near the field where Tropical is producing.

Geophysical and other work continues on other Standard of California concessions in Colombia, all under Richmond Petroleum Company of California, President Follis said. There are 1,380,000 acres involved in the Magdalena Valley and two other areas and Richmond also has applications for more acreage.

The OIL WEEKLY
Monthly International Section

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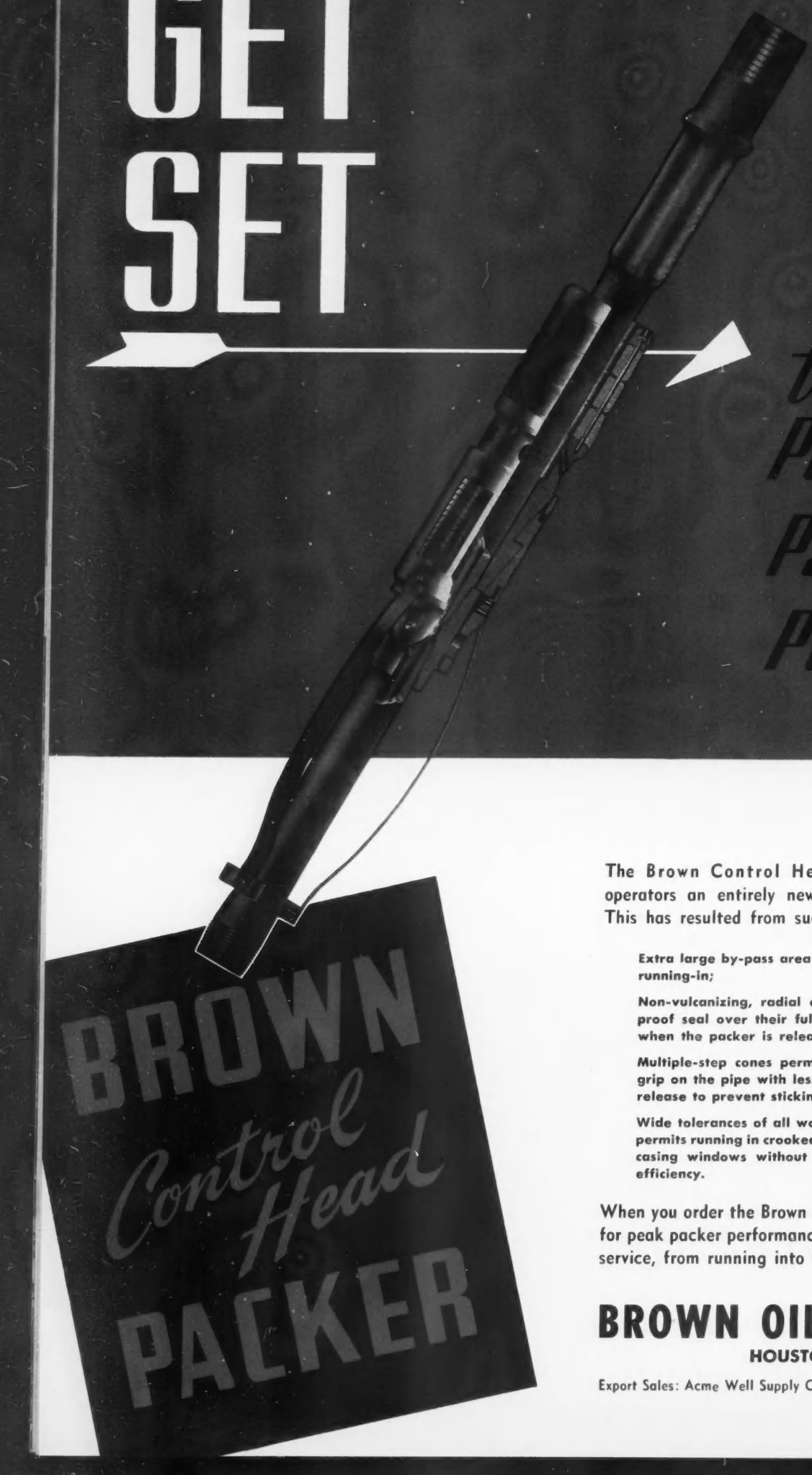

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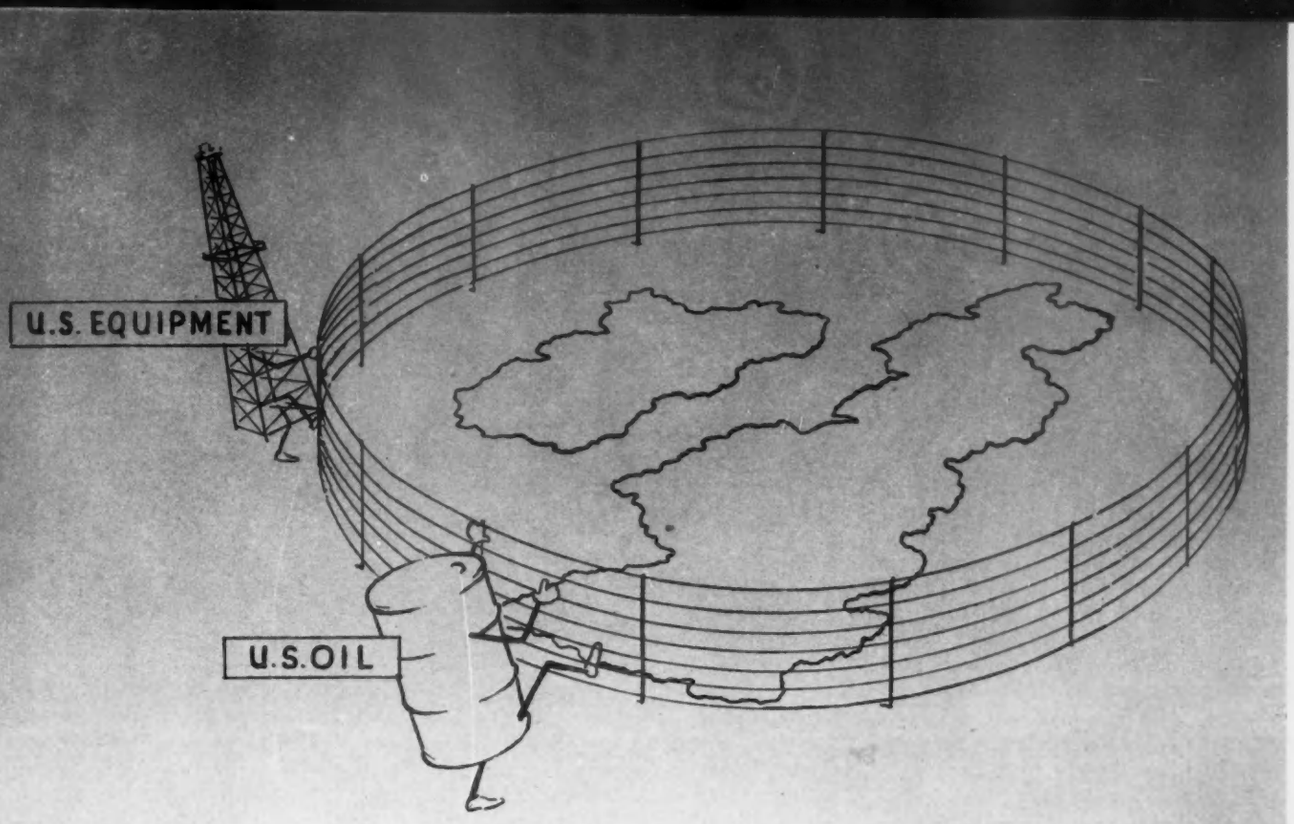


The British

STERLING BLOC(K)

By HENRY OZANNE, Staff Writer

THE trend away from dollar purchases is seriously retarding export business of U. S. oil field supply manufacturers into the British Sterling Bloc as well as curtailing the export of crude and products from this country to the United Kingdom.

At the same time, and because of the purchasing restrictions, American oil companies operating in regions where currency is tied to the British pound are being seriously disadvantaged in procuring their field equipment needs. American oil field equipment manufacturers are finding it difficult to do business with British oil companies, wherever they may operate, and since the United Kingdom is said to control about 10 percent of the world's current oil production this amounts to a sizable item.

This current trend away from dollar purchases is reflected in the oil imports into Great Britain in January, 1946, as compared with January, 1945 which were itemized in the recent issue of the Board of Trade's Monthly Accounts Relating to Trade and Navigation of the United Kingdom.

During January, 1945, the United States consigned 358,330,000 gallons of petroleum and petroleum products, while in January, 1946, consignments from this country totaled only 121,845,000 gallons. Consignments from other foreign countries during January, 1946, totaled 205,464,000 gallons. A majority of this gallonage was imported from Iran and Venezuela, where products are payable in Sterling. These two countries were not listed as consignors during January, 1945.

During January, 1946, both the Netherlands West Indies and Venezuela shipped more crude oil to the United Kingdom than did the United States. However, the United States consigned more motor gasoline, lubricating oil and gas oil than any other country.

A survey of a number of large American oil companies discloses that the American petroleum industry is paying about 45 percent more in the Sterling Area for supplies from British manufacturers than would be the cost if the American companies were unfettered by the Sterling restrictions.

This whole serious situation was underscored during the first three months of 1946 when, because of the closing of the American office of the British Ministry of Fuel and Power, many American companies sent representatives to London to deal there directly with the Ministry, and in some cases to open offices there as an almost necessary condition now for the handling of all orders requiring British approval.

Effect Of Restriction

The British purchasing restrictions are having different effects on different types of American companies. Some oil field equipment houses report that their loss of export volume in the Sterling Area is 100 percent—no sales having been effected in months. Others have suffered a curtailment of half their export trade. Some of the American oil companies find a cost increase up to 200 percent on a variety of items they are forced to buy from British plants.

In general, British policy is to protect as fully as possible the inadequate supply of dollars by compelling all purchases in the Sterling Area to be made from British manufacturers. "Buy British or do without it" is the guiding principle of London's trade strategy. The British purchasing limitations operate in a two-fold manner: (1) All companies, both American and British, op-

erating within the Sterling Area through the medium of sterling are prohibited from converting sterling currency into dollars for any purchases in the United States if it is at all possible to make these purchases, or obtain substitutes for them, from British industry. (2) All British companies operating even outside the Sterling Area are prohibited from making American purchases except in cases of drastic need.

To understand the problem, the following background information is essential:

The "Sterling Bloc" began to form as early as 1931 when Britain abandoned the gold standard and devalued her currency. The bloc took shape when certain nations in the British trade orbit fixed the exchange values of their currency in terms of the British pound, maintaining large parts of their reserves in sterling. This group of nations, including Britain, became known as the "Sterling Bloc" or the "Sterling Area."

In the middle 1930's this Sterling Bloc included several non-British nations, Portugal, Norway, Finland, Denmark and Estonia. However, the Sterling Bloc was wholly reconstituted following the outbreak of World War II when most of the non-British countries left the bloc. At present the Sterling Area comprises all the British Commonwealth and British Empire with the exception of Canada and Newfoundland, and also includes British mandated territories, British protectorates, protected states, Egypt, the Sudan, Iraq, Iceland and the Faroe Islands. All these countries do most of their trade with each other and with Britain.

With the outbreak of war exchange control was initiated and the Sterling Area became a unit for exchange control purposes. Movement of funds within the area remained free, but the fence of exchange control was built around the whole area separating it from the rest of the commercial world.

Another feature of the system is the "dollar pool." All the nations of the Sterling Area agreed in 1939 to pool their dollars; that is, to sell their foreign exchange income to Britain and thus maintain their entire reserves in sterling assets. In return for this, Britain supplied dollars from the pool for the essential imports of the various nations participating in the plan.

The overall purpose of the Sterling Bloc and its "dollar pool" was to protect the growing scarcity of dollars, caused by the huge British purchases of war goods in the United States. For instance, Britain alone spent more than $6 billion between September, 1939, and March, 1943, and to finance such a total transaction sold vast amounts of her dollar resources.

In June, 1940, as a further means of financing the war, Britain seized the American investments of British citizens, compensating them in sterling, and sold the securities in the United States for dollars. At that time, too, she drastically limited her imports and increased her exports in an attempt to obtain dollars.

Then lend-lease was instituted, assuring Britain of a steady supply of essential requirements despite the exhaustion of her dollar resources. But even under Lend-Lease Britain needed many goods and services not provided for in the act. In 1944 she and the other sterling countries spent more than $1 billion in the United States, and in that year Britain reduced her imports to only 31 percent of the 1938 volume.

With the abrupt end of Lend-Lease, Britain again found her commercial life badly crippled. Since that time two factors have contributed to Britain's tightening trade restrictions: (1) the psychological one of resentment against the way the United States terminated Lend-Lease. This resentment has been a powerful influence in the British policy of retaliation against American goods. (2) The economic one of still more drastic controls to conserve her dwindling dollars to purchase food and other absolute essentials.

Hence, in a sense it is natural that the oil industry is faring so badly under British trade controls. Britain deems it virtually impossible to spend her scarce dollars for any material or product that can be secured from British sources. Before January 1, 1946, all applications for purchases in the United States of oil field equipment were first screened in this country by the office of the Petroleum Division of the British Ministry of Fuel and Power, then such applications as were approved here were sent on to London for final clearance. Beginning this year, however, the Ministry's offices formerly maintained in New York and Washington have been closed, and all application must now be routed directly through London.

Another Handicap

This change of procedure in itself is a further inconvenience for American interests. It is impractical to attempt to negotiate with London by mail, and so most of the large companies operating in the Sterling Area are opening offices in London to process the applications for purchases. In London this requires a representative of the American company queuing up in a long line before the Ministry of Fuel and Power, requiring sometimes the best part of a whole day to reach the proper official in the office of B. J. Ellis, chief of the Petroleum Division of the Ministry. Then the application is thoroughly scrutinized and the bearer is called on to justify his company's need for the supplies requested. Then the applications are rejected or given the British AA stamp (acquisition authorization) allowing the purchase to be made in the United States.

However, there is often considerable delay—a month or more—before any action is taken on the application. During that time the British government canvasses British manufacturers to ascertain if the requested supplies can be obtained from British sources, or if substitutes in Britain can be found. In many cases, where no British manufacturer is producing the needed item, the British government orders a manufacturing plant to accept the order for future delivery even though such action entails tooling up to manufacture the article and results in as much as an 18-month bottleneck in production and a cost perhaps 100 percent in excess of that for the American product.

This British policy of "forced orders" is resulting in queer manufacturing wrinkles. Roofing houses are making tanks; surgical goods makers are turning to gears. Meanwhile, under such a system the British backlog of orders is mounting and there is little rationalization being achieved in British industry; costs are too high, continuity of technological development is disrupted, and makeshift operations rather than efficient industrial management are necessitated.

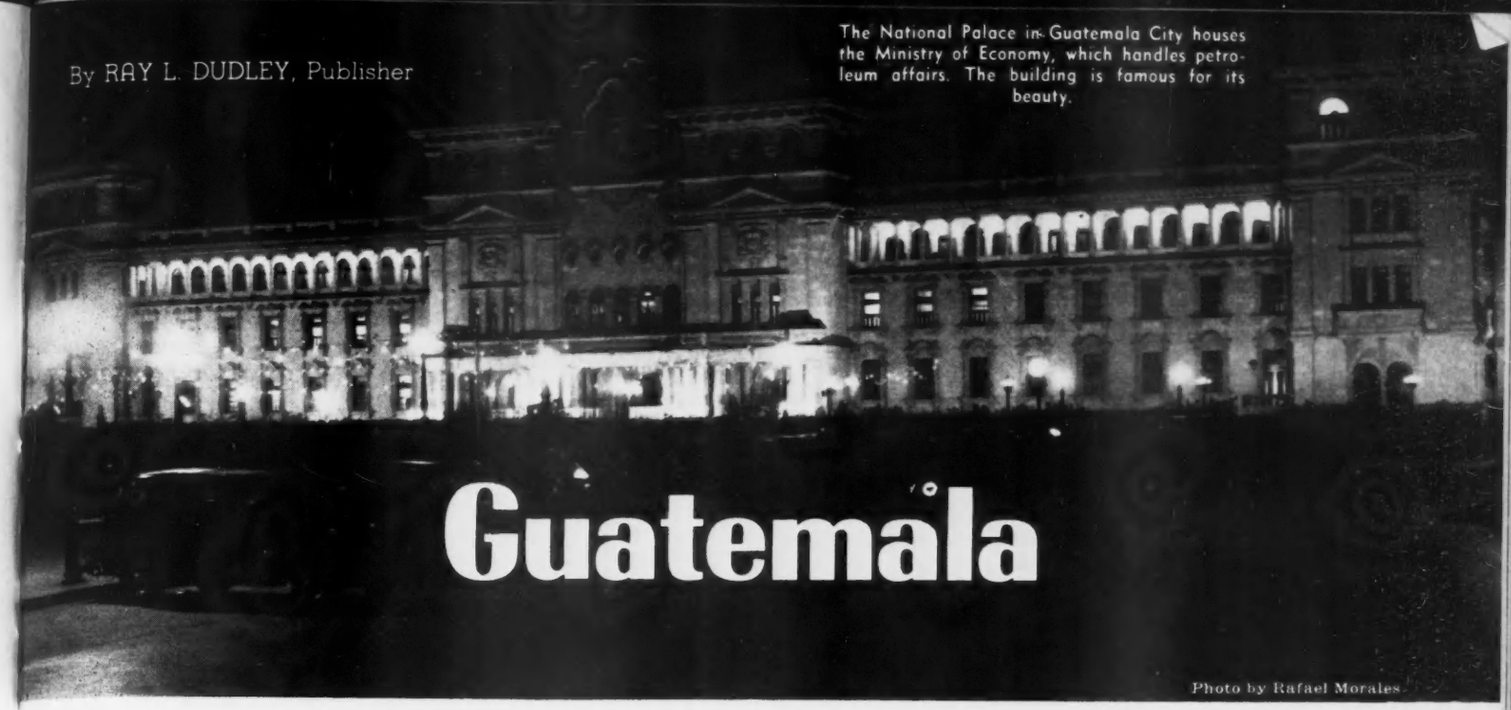
It is impossible to predict British decision on any particular application. The general policy, of course, is to disapprove applications for purchase outside the Sterling Area, but one major American oil company has had a run of unusual luck, winning approval of nearly all its recent applications. Others report they are practically shut out. Drilling equipment manufacturers in the United States are perhaps the worse hit. Some of these firms have been unable to obtain British approval on a single purchase in the last five months.

This especially tight situation in regard to drilling equipment may reflect British policy to foster British industry handling such items. Practically all pieces of oil field drilling equipment are now being manufactured in Britain—even drill pipe and tool joints, two items which were never satisfactorily produced in England. One observer reports that the British plants are far behind the technical advancement of American manufacturers on such products.

One American major company official estimates that about 80 percent of all oil companies' applications involving American purchases to fulfill requirements are now being rejected by Lon-

■ COTINUED ON PAGE 8

By RAY L. DUDLEY, Publisher



The National Palace in Guatemala City houses the Ministry of Economy, which handles petroleum affairs. The building is famous for its beauty.

Photo by Rafael Morales

Guatemala

Plans Open Door Oil Policy

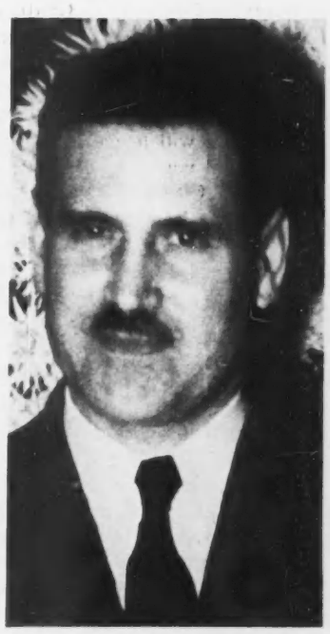
IMPORTANT modifications of the constitution of Guatemala and the laws implementing it with respect to petroleum exploration will be offered the Congress of Guatemala late in May or early in September, Manuel Noriega Morales, Minister of Economy, told me in an interview in Guatemala City.

The proposed changes are intended to make development of Guatemala's oil possibilities more attractive to outside capital, the minister said. The present law, which it is proposed to change, limits exploration to companies in which at least 51 percent of the stock is owned by citizens of Guatemala, and it was indicated that the new law will place no limit on the percentage of ownership in an oil company operating in Guatemala. A graduated royalty is being considered.

Unwise Law

The present law was hailed as ideal by many of the people of Guatemala when it was passed but it has had the effect of retarding, rather than aiding, development. Consequently, some time ago Max Thornberg, formerly with Standard Oil Company of California, later with the United States State Department as a petroleum adviser, and now an independent consultant, was called into conference with the staff of the Ministry of Economy under whose jurisdiction petroleum affairs are handled.

He made two trips to Guatemala, discussing the various problems involved and the conditions obtaining in Guatemala. The ministry also has made a study of the petroleum laws of other countries. Thornberg's final report, containing his suggestions for various factors to be included in the proposed change in constitution and laws, is now due and on receipt of it the ministry will proceed to draft a proposed law which will be realistic in nature but which will



Manuel Noriega Morales, left, is Minister of Economy of the Republic of Guatemala who now has charge of affairs relating to petroleum exploration. He is 38 years old, was educated in Guatemala with post-graduate work in economics at Harvard. He holds a degree of Doctor of Economy and was one of the first graduates in the School of Economy, University of Guatemala. He specialized in accounting and banking in his college work and has written several dissertations on matters pertaining to production and corporations. He has been connected in various capacities with the Guatemalan government for the past 17 years, has been a professor in the School of Accounting, University of Guatemala, and also a professor of commerce and banking. He was a delegate to the Chapultepec and San Francisco conferences and more recently attended the international financial conference at Savannah, Ga. He speaks English fluently.

Roberto Guirola, right, is Minister of Agriculture, Republic of Guatemala. Until a short time ago petroleum affairs were handled by his department. He was educated in Guatemala and the United States and is highly regarded by the agricultural interests of the country. He will visit the United States shortly.

still preserve the interests of the nation.

The minister told me that in his opinion the Congress would pass the law which seems to have the support of the presidential cabinet. The Congress of Guatemala is now in session but the present session will end at the close of May, the body to reconvene in September.

"We should like to present the proposed law in May," said the minister, "but we wish to make sure that we have prepared the best possible law before presenting it to the Congress. Consequently, it is entirely possible that it may not be offered until in September."

The impression was gained, however, that even in advance of the presentation of the bill to the Congress, the ministry would not be averse to discussing possible exploration with foreign interests.

Concessions Sought

At this time no one has a petroleum concession in Guatemala, the minister said, although two applications for concessions are pending, one from Guatemaltean interests and one from an individual in the United States. Government officials seem to be of the opinion that the best possibilities for oil are in the northeastern portion of Guatemala.

Formerly affairs pertaining to petroleum exploration were vested in the Ministry of Agriculture but several months ago they were transferred to the Department of Mines which is a department of the Ministry of Economy. Morales, head of the Ministry of Economy, speaks fluent English and impresses his visitors as being a highly capable and conscientious governmental representative. The same thing applies to the Minister of Agriculture with whom I talked.

One thing is certain, whether or not exploration finally puts Guatemala into the list of nations producing oil: if headquarters of oil companies operating in the Republic are located in Guatemala City, as it appears likely they would be, the location will prove a popular choice with the oil company employes because Guatemala City is justifiably noted for its beauty and climate. Only a few days' stay are necessary to cause the visitor to be impressed by it and the resorts of Guatemala are gaining a world-wide reputation.

Although Guatemala has never been drilled for oil, the lowland El Peten area in the northern part of the country has reported seepages along the Rio Pasion and Rio San Pedro and at the western flank of Cockscomb Mountains. Shell interests had acquired concessions in El Peten and held them for a number of years but released them without drilling. Gulf interests also held acreage here but did not drill.

The British Sterling Bloc(k)

■ CONTINUED FROM PAGE 4

don, and that figure includes nearly 100 percent of the regular lines of the oil field supply houses. Some leniency is still being shown on refining and marketing installations requirements.

Economic Nationalism

What sort of competition does this mean for American industry and the American oil companies in particular? Many American oil men believe that a chief, if not the first, aim of the British trade policy is to foster British industry, and that the dollar scarcity argument, while true, is merely an excuse for British economic nationalism. In support of this position, they point out that Britain restricts the movement of American goods into the Sterling Area by the denial of import permits even where no dollar exchange is involved. For instance, American oil companies willing to spend their own dollars for American supplies have been refused the right to ship such material to their foreign properties in the Sterling Area.

However, other observers point out that British companies are actually at a greater competitive disadvantage under British trade barriers than are American concerns because the British companies have to "buy British" even outside the Sterling Area and thus are denied the right of taking advantage of any price or delivery preferences from American manufacturers. For instance, British oil operators in Venezuela, Colombia, Peru and Equador, while outside the Sterling Area, still must have their requirements approved by London.

These two policies of protecting her short dollars and her home industry are tied together for Britain into one economic pattern into which it is not necessary to read any malicious intent. Britain was the exponent of free trade until about 1931, when she found herself in an unbalanced position due to the fact that many other countries—including the British Dominions and India—had developed substantial tariffs. Britain then developed a policy of trade control which widened her protective duties, counter-discriminated where other nations were discriminating against her goods, introduced quota control over imports, and evolved the plan of granting preferences over the whole range of her duties to countries within the British Commonwealth and Empire.

Britain emphasized that such a program was not aimed at reducing total purchases abroad but at giving Britain the assurance she would be able to sell as well as buy in the world market. The tariff system which Britain developed in accordance with this program was based on the assumption that Britain stood in a special relationship to other British countries in trade matters.

British-U. S. Agreement

Britain and the United States concluded a trade agreement in 1938 designed to minimize trade barriers. Britain agreed to reduce the duties on various commodities, representing a total value of 10 million pounds sterling of imports from the United States. The United States reduced duties on textiles and a number of other commodities. The full effect of this treaty could not be felt before the outbreak of World War II, but the result of tariffs and imperial preferences had been a reduction in British imports from non-British countries. In 1930 Britain was importing 29 percent of her total volume from other British countries; in 1932, this had risen to 35 percent, and in 1938 to 40 percent. However, exports from the United States to Britain rose during the same time from $374 million in 1931 to $521 million in 1938.

Britain's need to export is far greater today than before the war. During the war she sold off a large part of her gold and foreign investments, incurred sterling debts for war goods totaling about $14 billion, and turned drastically from her normal export trade. Undoubtedly, she faces a gigantic task in striving to recover these losses. The British government has indicated an intention to seek cooperation in the field of international trade and to work for the reduction of tariffs and other trade barriers.

The pending $3¾ billion American loan to Britain undoubtedly would benefit the petroleum industry. Coupled to the grant is a proviso that the dollar pool shall be abolished in one year and other trade restrictions lifted. Even without these terms formally written into the loan, the effects of the grant would be such as to allow Britain to make purchases of American materials and supplies needed to rehabilitate its own industries. Such a revival of export trade would certainly relieve the pressure on the British balance of international payments and make it reasonable for the British government to abandon its rigid controls on international transfers of funds.

In the financial agreement, signed December 6, 1945, the British government agrees that if Congress approves the loan, all restrictions will be lifted within a year which now prevent members of the Sterling Area from using their sterling and dollar resources freely for purchases anywhere. In addition, the British government pledges itself to follow a non-discriminatory policy respecting international trade and finance.

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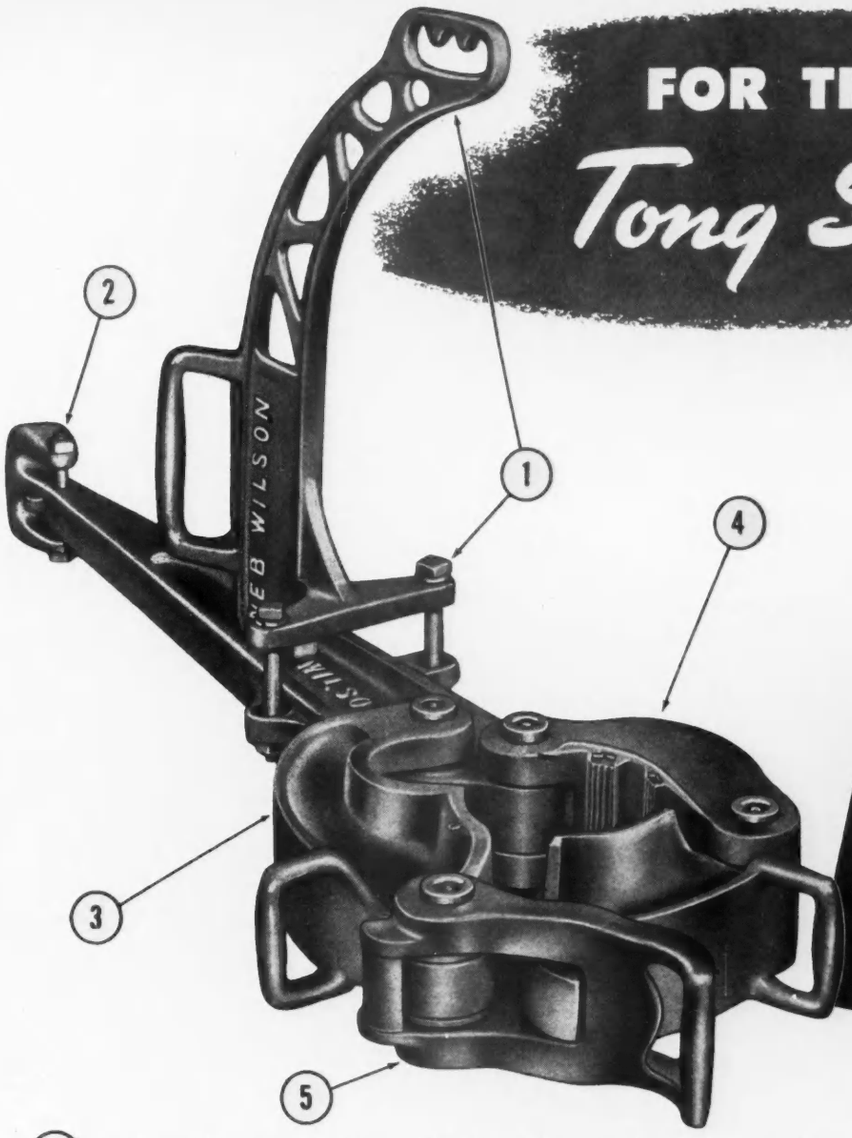

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3. Keep pins lubricated with pressure grease.
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JAPAN

By BERTRAM F. LINZ, Staff Writer

JAPANESE oil production within the empire is only a fraction of its prewar consumption, even before it embarked on a campaign of world domination by invading China some 20 years ago, it is disclosed by a survey compiled during the war by the Bureau of Mines and until now held confidential as military information.

Japan's oil reserves were estimated in 1924 as 56 million barrels, and the probable maximum as 500 million barrels. Since that time 20 million to 25 million barrels have been produced, but in spite of extensive exploration and large government subsidies, no new reserves have been reported.

Principal oil field of the Japanese empire is in the prefecture of Akita, on Honshu, where 1,799,310 barrels, or 70 percent of empire output, was produced in 1936. The next in importance is in Niigata Prefecture, with a 1936 production of 584,813 barrels, or 23 percent. The remaining seven percent came from Hokkaido, 76,226 barrels; Formosa, 45,440 barrels, and other fields, 40,555 barrels, for a total of 2,546,344 barrels.

The bureau study explained that the main Akita fields are in the districts of Toyokawa, Kurokawa, Michikawa and Asahigawa, lying one to 15 kilometers (½ to nine miles) north of the city of Akita. The next field is in the Yuri district, about 16 kilometers (ten miles) south of Akita. There is a small production in Katte, about four kilometers (2½ miles northwest of the Yuri district; at Oguni, some 32 kilometers (20 miles) southwest of Yuri, and at Hibiki, some 45 kilometers (28 miles) northeast of Akita. The field is said to be 30 to 50 kilometers (20 to 30 miles) wide by 170 kilometers (105 miles) long, and the wells are 100 to 800 meters (330 to 2625 feet) in depth.

In Niigata Prefecture the oil belt is said to be 20 to 40 kilometers (12 to 25 miles) wide by 200 kilometers (125 miles) long. The main fields start at Niitsu, run southwest to the districts of Omo, Higashaiyama, Nanokaichi, Nishiyama and Kubiki, the last being some seven kilometers (four miles) southeast of the town of Takada. Wells run from 160 to 1400 meters (525 to 4600 feet) in depth, but in late years deeper wells have been drilled owing to the depletion of oil in the shallower sands.

The Hokkaido fields extend along the western side of the island, passing through the provinces of Kitami, Teshio, Ishikari, Iburi and Hidaka. Producing fields are Ishikari, eight kilometers (6½ miles) northeast of Ishikari; the Yufutsu, 12 kilometers (7½ miles) northeast of Hayakita, and Masuhoro, in the Soya district. Wells are 66 to 700 meters (215 to 2300 feet) deep.

There are small fields in the western side of the southern (Japanese) part of Sakhalin Island, known as Karafuto, but they have not yielded much oil, the report stated. The Japanese obtained their oil from Russian Sakhalin, where they had concessions running for 25 years from 1925 and which in 1941 were extended for another five years; these concessions were given up in 1944 under pressure from Russia.

Formosa Fields

In Formosa (Taiwan), the oil belt is 350 kilometers (215 miles) from north to south on the western side of the island. There are two fields, the Shikkoko, 12 kilometers southeast of the town of Byoritsu, and the Kinsui, eight kilometers northeast of Byoritsu. Wells are from 200 to 1000 meters (650 to 3280 feet) in depth. The Kinsui was developed as a gas field, and some wells have been drilled to over 12,000 feet.

The bureau pointed out that although the oil fields in Japan, Formosa and Sakhalin are limited and the output could not be greatly increased, Japan could obtain great quantities from the large deposits of oil shales in Manchuria and could make synthetic oil from the coal found in most parts of the empire. Realizing its dependence on imported oil, Japan began experimenting through the South Manchurian Railroad Company, with the oil shales of Manchuria before 1930 and in that year produced some 50,000 barrels of oil. By 1935, production was up to 840,000 barrels, and in 1939 the Japanese decided to increase output by 3,625,000 barrels. Later this figure was again raised, although it is now thought that the total production of oil from shale never exceeded 4 million barrels a year.

Meantime, the Japanese navy, the South Manchurian Railway and various private companies, including Mitsui and Mitsubishi, began experimenting in the early 1930's with the liquefaction of coal, using various foreign processes, such as hydrogenation, Fischer-Tropsch, and low-temperature carbonization. They made various modifications in these processes to fit the local coals and conditions, and plants were erected in the home islands, as well as in Korea, Manchuria and Karafuto. There was no commercial production until 1939, but after that output rose rapidly, and in 1937, at the time of the invasion of North China, the Synthetic Petroleum Production Law was set up to encourage the industry by government help, remission of taxes and the granting of subsidies.

35 Plants Planned

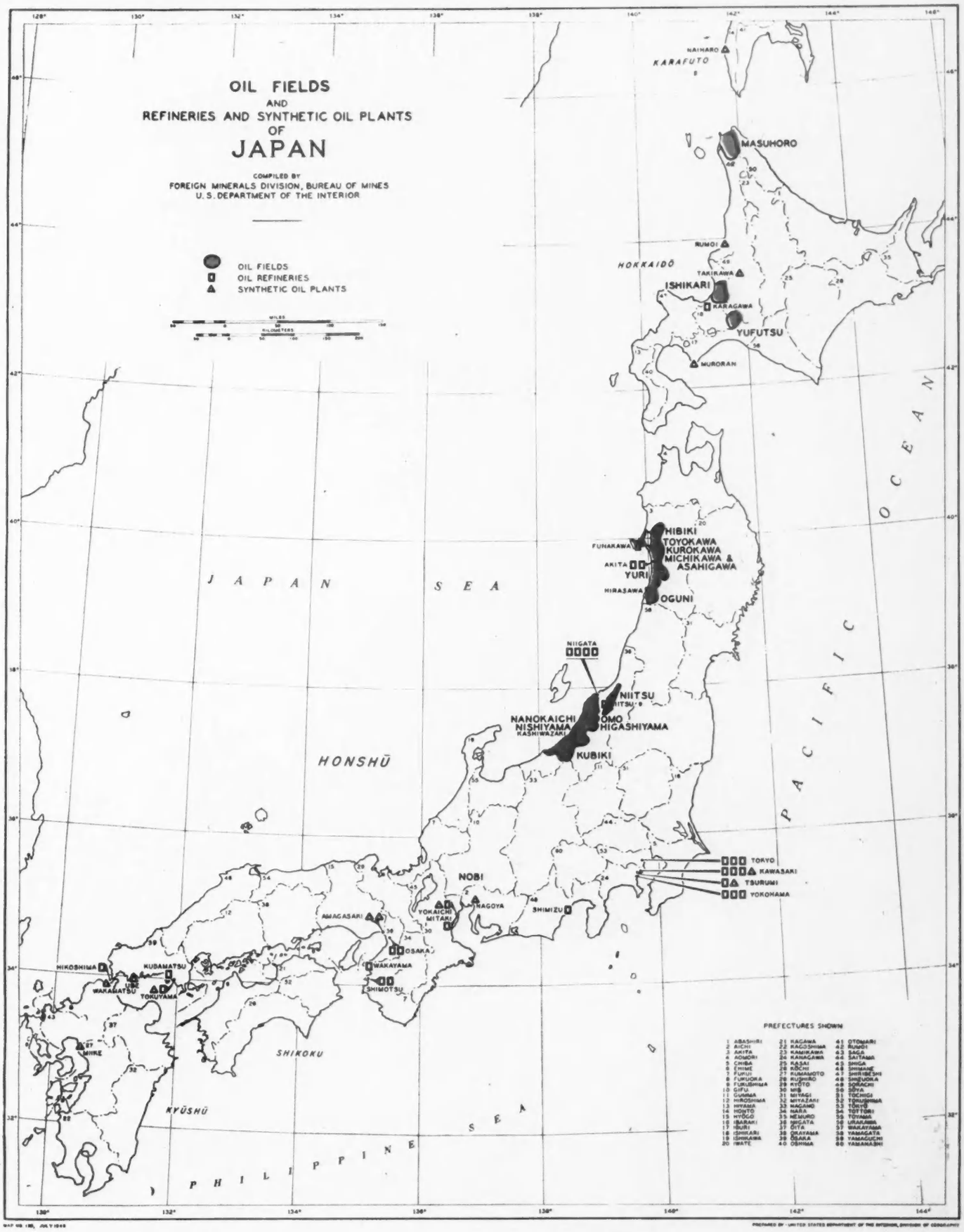
It is estimated that 35 plants, with an output of 8,313,000 barrels annually of all products, were built or planned. This was a naval intelligence estimate, which in 1943 was raised to 10 million or 10,410,000 barrels by Army estimates, and in 1944 was again raised to 12,571,000 barrels by the Foreign Economic Administration.

As 1944 went on and the American forces approached nearer Japan, a careful check was made of the aerial photographs and reports, and it was discovered that the Japanese, after their quick conquest of the oil of Borneo and the Netherlands East Indies, had not pushed the synthetic-oil program as expected, and an FEA estimate of 8,537,000 barrels for 1944 was accepted. Later studies were convincing that there were only 23 plants with an annual production capacity of 4,170,000 barrels

Prepared during the war, the report's figures on production, imports, etc., were naturally based on such information as the various intelligence services were able to secure. FEA figures placed 1944 production at 3,190,000 barrels, and imports at 55,970,000 barrels, giving Japan a total of 59,160,000 barrels, the greatest supply it ever enjoyed. Estimates, however, placed the probable 1945 imports at only 10 million barrels, with domestic production unchanged, giving Japan approximately what it had in 1929.

The bureau explained the heavy 1944 supply as due to the fact that while the Dutch did a fairly good job of blowing up wells and refineries as the Japanese advanced in the early days of the war, the North Borneo fields of Seria, Tarakan and Tamarinda districts are shallow and were quickly put into commission and the refineries rebuilt by the Japanese.

"In fact," the report commented, "it is believed that the Japanese had more oil than they could transfer with the tankers they had available. As our sinking of tankers continued and our bombing of refineries kept these out of commission, the picture changed rapidly, and the Japanese had to begin using their stored fuel."


OIL FIELDS
AND
REFINERIES AND SYNTHETIC OIL PLANTS
OF
JAPAN
COMPILED BY
FOREIGN MINERALS DIVISION, BUREAU OF MINES
U.S. DEPARTMENT OF THE INTERIOR
OIL FIELDS
OIL REFINERIES
SYNTHETIC OIL PLANTS
KARAFUTO
NAIHARO
MASUHORO
RUMOI
TAKIKAWA
HOKKAIDŌ
ISHIKARI
KARAGAWA
YUFUTSU
MURORAN
HIBIKI
TOYOKAWA
KUROKAWA
MICHIKAWA & ASAHIGAWA
FUNAKAWA
AKITA
YURI
HIRASAWA
OGUNI
NIIGATA
NIITSU
NANOKAICHI
NISHIYAMA
KASHIWAZAKI
OMO
HIGASHIYAMA
KUBIKI
HONSHŪ
JAPAN SEA
PACIFIC OCEAN
TOKYO
KAWASAKI
TSURUMI
YOKOHAMA
NOBI
NAGOYA
YOKAICHI
MITAKI
SHIMIZU
AMAGASARI
OSAKA
WAKAYAMA
SHIMOTSU
HIKOSHIMA
KUDAMATSU
WAKAMATSU
TOKUYAMA
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PHILIPPINE SEA
PREFECTURES SHOWN
1 ABASHIRI
2 AICHI
3 AKITA
4 AOMORI
5 CHIBA
6 EHIME
7 FUKUI
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35 NEMURO
36 NIIGATA
37 OITA
38 OKAYAMA
39 OSAKA
40 OSHIMA
41 OTOMARI
42 RUMOI
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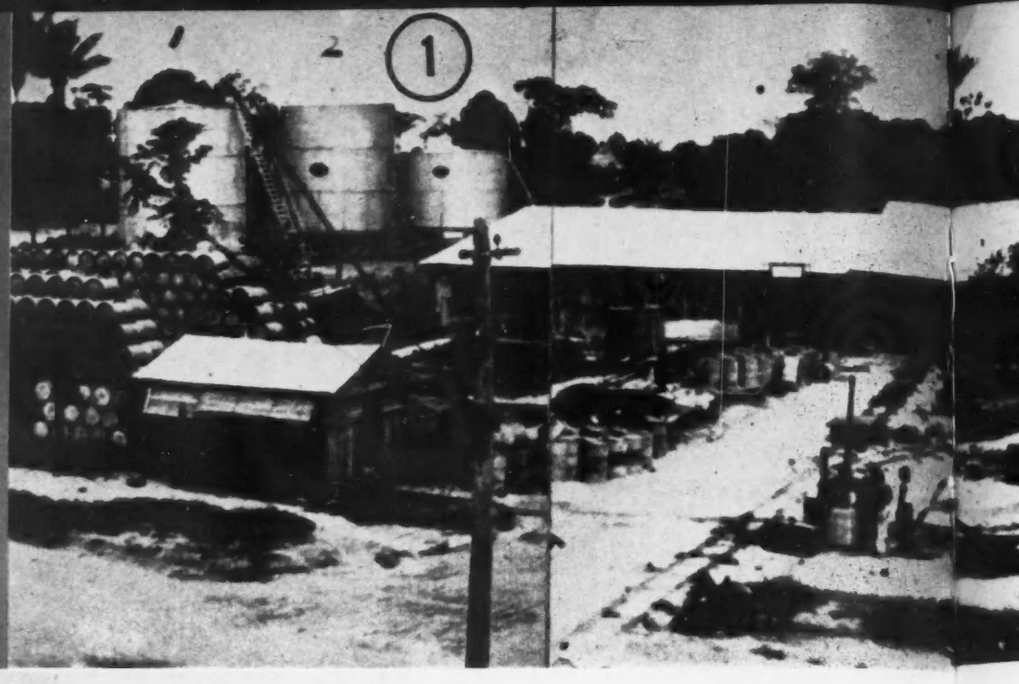
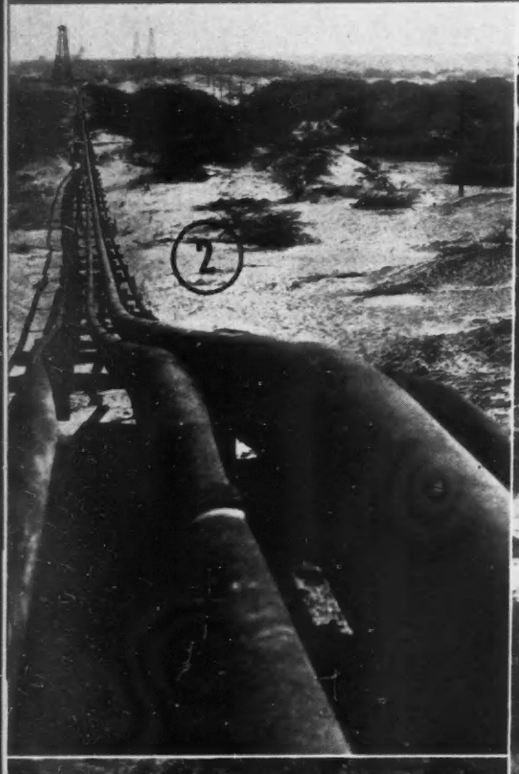
Peru





A PLAN to throw open Peru's important oil reserves to foreign exploitation, drawn up by a United States petroleum engineer, is being studied by Peruvian government officials and representatives of foreign oil companies.

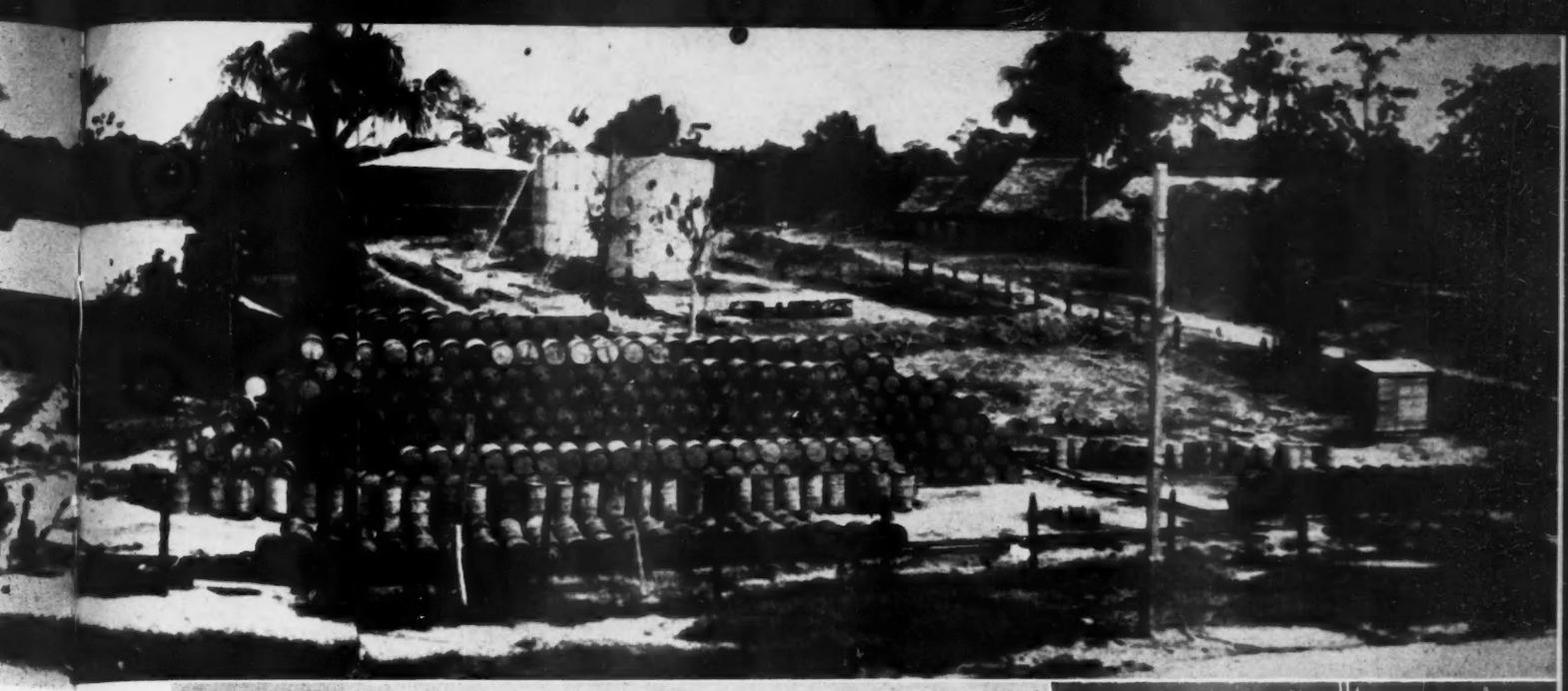
One of the points of the plan proposes that royalties resemble the prevailing Venezuelan scale of 16⅔ percent. Representatives of the oil companies claim such royalty is fair enough in proven fields like Venezuela, but were high for Peru, where exploration costs are probably the highest in the world and where a trans-Andean pipe line to bring the oil out to the west coast might cost as much as $30 million.

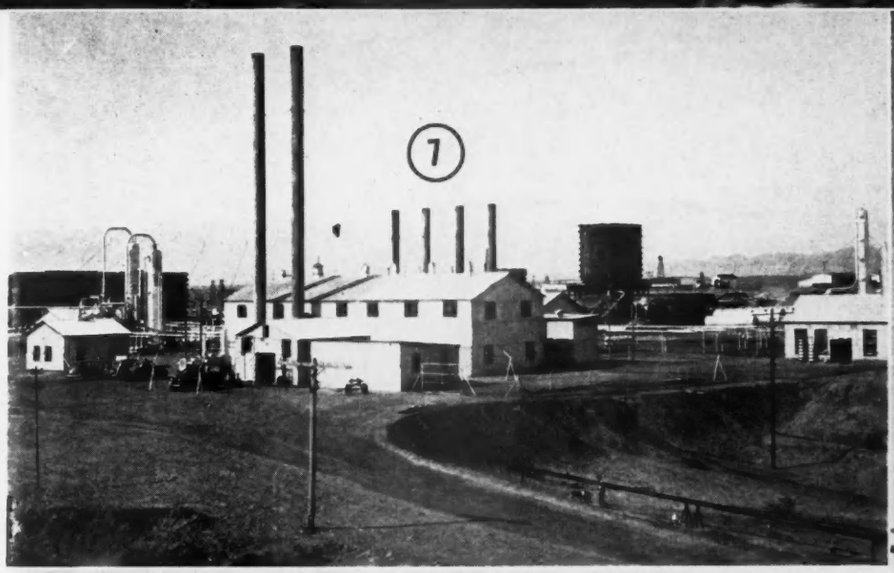
On the other hand, Peru officials believe they have granted a concession by cutting the combined royalties and export tax from their present peak of 37 percent.

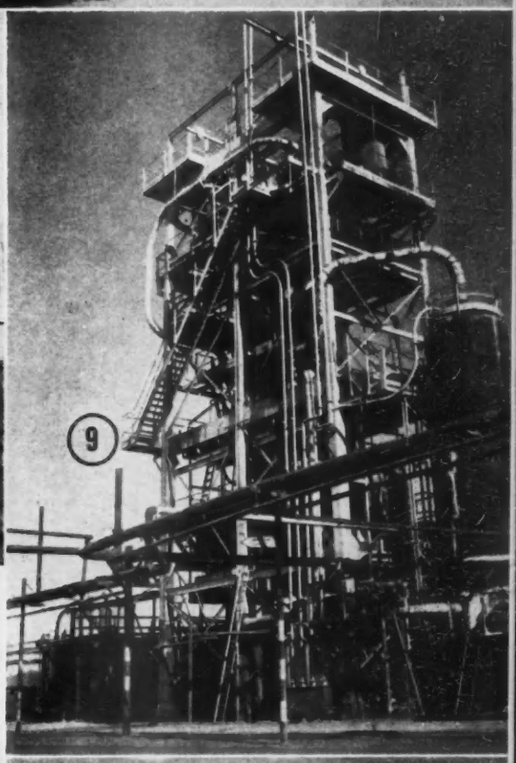
Factors which may influence oil companies in exploring in Peru are the political threats to Middle East sources of oil and possibilities that Peru's Amazonian fields may be even richer than Venezuelan fields.

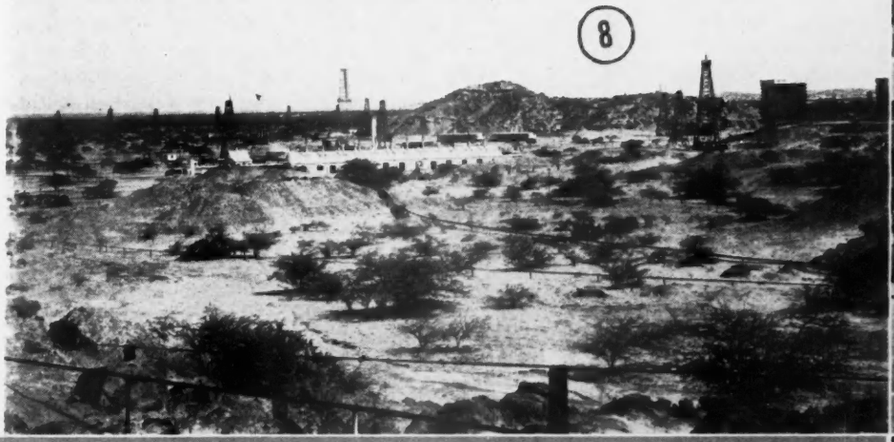
Peru's oil stock soared in 1939 with the discovery of the Ganso Azul (Blue Goose) Petroleum Company in the Montana, as the Amazonian foothills east of the Andes is called by Peruvians. This geological oil dome was spotted from an airplane by a United States geologist on a mission to explore the possibility of constructing a railroad through the trackless Montana. The company's discovery well was completed in 1939 for 750 barrels of oil daily.

1. Bulk station of the Compania Petroleo Ganso Azul at Iquitos, Peru. It is 2000 miles above the mouth of the Amazon and 1000 miles downstream from the company's wells and skimming plant at Agua Caliente on the Pachitea River, a branch of the Ucayali River, Eastern Peru's principal "highway."
2. Pipe line from International Petroleum Company's Negritos field to the Talara refinery.
3. A stream of hot water flows from the springs which give Agua Caliente its name.
4. A view of Agua Caliente.
5. This primitive method of transportation was formerly used to take gasoline from the skimming plant at Agua Caliente to jungle settlements several hundred miles downstream.
6. The next step in transportation development was the use of barges.









7. International's casinghead gasoline plant at Negritos.

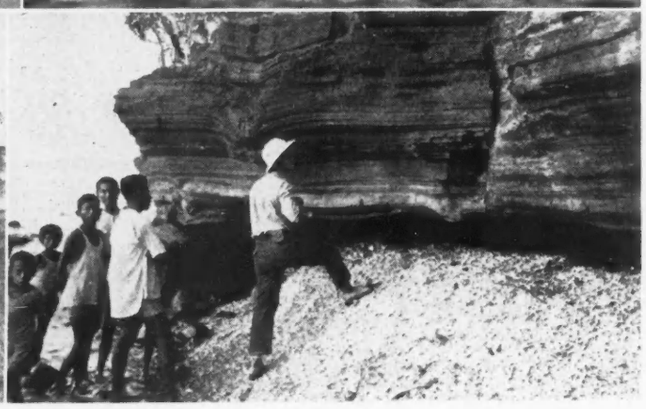
8. Part of the Negritos field (International) showing one of its six gasoline plants.

9. International's refinery at Talara.

10. One of International's schools for the children of its employes.

11. Aerial view of Talara, showing International's tank farm, refinery, employes' homes and workers dormitories. The company plans to spend $15 million on a modernization program here.

Philippines Oil Development



Upper right: Pipe racks, warehouse and office building at rig site, Barili. Lower left: Moving in a tractor at Barili. Lower right: Geologist E. F. Taylor goes about his work as a crowd of curious natives looks on.

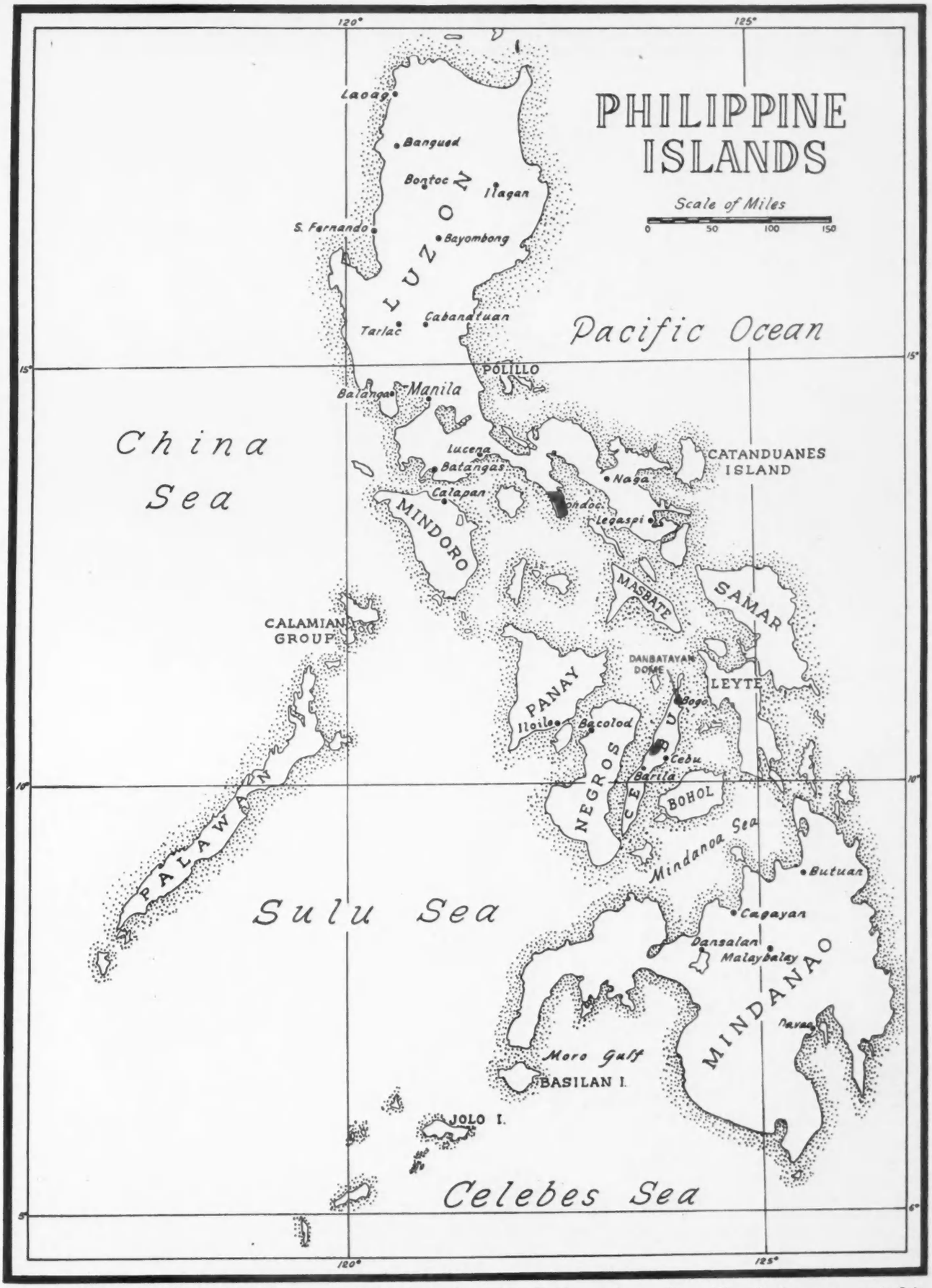
By H. FOSTER BAIN, Mining Geologist

GEOLOGICALLY, the Philippine Islands do not represent a part of the main continental mass of Asia. Rather they are a wrinkle in the sea bottom pushed up to the surface in relatively recent geological times. They are situated at the outer edge of the continental shelf, here covered by a shallow sea which extends west to the China coast. Beyond the islands to the east is one of the profound deeps of the Pacific Ocean and it is a bit puzzling to understand how the ocean bottom could be pushed up along a narrow line at the edge of the shelf of older rocks and dropped to such great depth immediately beyond. The result, however, has been to make a very new land. None of the older rocks found in the neighboring part of China appear in the Philippines. The oldest known are certain ammonite bearing sediments found on the east coast of Mindoro in the course of the recent petroleum geological survey. These forms indicate an age at least as early as Cretaceos and may date back to the Triassic. Aside from these rocks all those found in the Philippines are Tertiary or younger, and much the larger portion of the area is underlain by Miocene. It is possible, but as yet not proven, that older rocks occur on Palawan, the long narrow island which runs southwest and formerly connected the main groups with Borneo. This island has been little studied and minerals and rocks have been brought from it which at least suggest a pre-Tertiary age. The larger part of Palawan, however, shows only Tertiary and recent rocks corresponding in character to those on the other Philippine Islands.

Igneous and Sedimentary

As has been stated the greatest development of any of the rock systems is that of the Miocene, though Pliocene and Recent beds cover considerable areas. Both igneous and sedimentary rocks are present. The igneous rocks are represented by a series of lavas and intrusives representing repeated periods of activity. The magmas were dominantly basic, ranging from peridotites and other ultrabasics, up to granodiorite. No true granite or other acid rocks such as are widely present on the neighboring mainland have been certainly discriminated. The sedimentary rocks are largely terrestrial conglomerates, sandstones, tuffs and shales. Old embayment areas show now as fine grained shales and coal beds. Limestone, mainly of coral reef type but including orbitoidal and true marine beds, are widespread. The Pliocene deposits are similar in character and the limestones form a continuous sequence from early Tertiary to modern fringing coral reefs. As would be expected, the individual beds thicken and thin rapidly and except for the painstaking and comprehensive study made in the laboratory of the National Development Company under the direction of Dr. Robert Kleinpell in 1940 and 1941, it would have been impossible to unravel the stratigraphy. This despite a secure foundation laid by the earlier work of the geologists of the Bureau of Science and Bureau of Mines and a study of the macropalentology of the rocks made in parallel by Prof. Poponoe of California Institute of Technology.

The major outlines of the geology of the islands had been worked out by early travellers and scientists, both Spanish and American, connected with various successive government bureaus, and by men sent to the islands by Standard Oil Company of California which, about a quarter century ago, undertook the first serious exploration for petroleum. In 1939 it was determined



Areas in red have been drilled and include about one-third of Bontoc Peninsula in Tayabas province on Luzon. The other important area is Cebu on which Daanbatayan dome is at the extreme north end not far from Bogo. Barili marks the important area on the west coast and it is a little south of Toledo. Near Toledo are a few shallow wells. All these are shown in red. Considered prospective territory also are the Tarlac area (on Luzon) and the island of Leyte. A number of favorable structures also have been found on the island of Panay.

Pay-day at the rig site

Typical native village

to undertake a comprehensive petroleum geological survey and the financing and administration was placed in the hands of the National Development Company, a wholly-owned government corporation.

The work was conducted in the closest cooperation with the Bureau of Mines which had been set up by the Commonwealth in 1936 to handle all ordinary matters connected with mineral resources. It was fortunate that this bureau was at the time under the direction of Querico Abadilla, a graduate of Colorado School of Mines who had spent nearly a dozen years in Mexico, Venezuela, Peru and Brazil in service of various American petroleum companies. Abadilla was a keen geologist and an able administrator. He was killed during the recovery of Manila and his loss leaves a gap hard to fill.

Survey Staff

The Petroleum Geological Survey of the National Development Company was under the direction of Grant Corby of Los Angeles and its staff included, in addition to the palenotologists already mentioned and Miss Harriet Williams, who came to the Philippines from the Foram laboratory of The Texas Company, such well known men as H. Norton Johnson, M. H. Billings, Joe Hollister, Fryxell of Augustana College, Earle Taylor of the Illinois Geological Survey, the young Bob Reed from California and others, including a full corps of excellent young Filipino geologists and engineers and Ramon Marquez an experienced Wisconsin trained mining geologist who served as one of the chiefs of party. Aside from Dr. Kleinpell and Miss Williams (now Mrs. Roger Morrison of the U. S. Geological Survey), the laboratory force was made up entirely of Filipino graduates, most of whom were beginning their professional work and some of whom are now making places for themselves with big American companies. Others have spent the war years with the Navy, the Army or the guerrillas. So far as is known all have survived.

It may be said in passing that experience with Filipino assistants has been very encouraging. They are faithful, teachable, ambitious and much like our own boys just out of school. If a party chief will but preserve the teacher-pupil relationship he will have no particular trouble. It is well to remember, however, the Filipinos of whatever rank or station can be lead but not driven. Even the workmen do not respond to the pick-handle Irish foreman type of direction formerly prevalent here. One of the reasons for the failure of the Japanese in the Philippines has been their disposition to slap people around.

The occasion for the organization of the special petroleum survey was the breakdown of the previous system of leasing and development. In 1902 the Philippine Commission promulgated a mining law closely modeled after our own of that time, providing for discovery, claim staking and assessment work leading to patent. No special provision was made either there or here for petroleum lands which were taken up either under the gold placer law or as thinly disguised lode claims. The "gypsum lodes" of Southern California will be remembered as illustrating the transparent fraud necessary if one wished to drill a wildcat on public land. Fortunately, petroleum did not attract much attention in the Philippines during this period and the only claims extant for which the title runs back to the old mining law are two or three on Leyte Island from which bituminous rock is mined for road-making.

Leasing Law Passed

By 1920 the absurdity of attempting development of petroleum under any such law had become apparent, and a leasing law was substituted. The Philippine law is No. 2932 and was approved August 31, 1920. It limited the area to be leased to any individual to 400 hectares, and to any association or company to 1200, and the term of lease to five years. The leases were renewable under conditions to be laid down by the Council of State. Regulations issued under the authority of this statute provided for a first geological exploration lease good for two years and, in event that adequate surveys had been made, the fructifications of this into a smaller drilling lease for a longer period. Royalties were generally to be 10 percent but decreased with distance from railroad or navigable water. While provision was made under which the Secretary of Agriculture and Commerce, who was to administer the law, could issue more than one lease to an individual, company, or corporation, advantage was not taken of this clause and the system proposed was a complete failure. Only one significant development has resulted from it. The law has never been repealed but granting of leases under it has been suspended.

The stringent provisions as to area and term of lease resulted from a phobia which in turn grew out of the history of land tenure in the islands, and was bolstered by our own anti-monopoly attitude which went into the Philippines along with our system of laws and government.

In the Philippines large land holdings were the rule in the past and the "tao" or small farmer was little more than a serf. In time great areas came into the hands of the Friars as well as the local gentry, and non-resident ownership led as it usually does, to oppression. Thus there was built up a deep feeling of resentment and fear of large land holdings. This is reflected in the constitution of the Commonwealth, which contains strong provisions against alien ownership or any aggregation of tracts into total ownership or lease amounting to more than 1064 hectares, about 2500 acres. This limitation is expressed in numerous statutes, especially the corporation law which prohibits any cor-

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poration dealing with land or national resources, owning any substantial interest in another such.

In 1934-36 there was a wild stock market boom in Manila based on the rapid and profitable development of gold mines. Interest spread to other minerals and numerous groups and individuals thought they saw fortunes ahead in establishing claims to petroleum lands. Virtually none of these claimants were qualified by experience, nor did they have the resources necessary to development of an oil field, but the local stock market seemed insatiable and the fever rose to a height that threatened a national scandal. President Quezon took steps to prevent this by asking the then Secretary for Justice, José Yulo, for an opinion on the legality of the various claims. Yulo found them defective under the provisions of the corporation law forbidding community of ownership. The President then directed that all the claims which on review showed no substantial equity be cancelled. This was done, leaving only three or four of small areas which covered shallow production or bituminous seepages on which minor operations had been conducted for years, pius three or four taken up under provision for geological exploration. Of these, all were subsequently forfeited save two, one in Tayabas and one in northern Cebu which came into the possession of the Far Eastern Oil Development Company. By permission of the Secretary these were consolidated and issued as one lease.

Far Eastern Company

The Far Eastern Oil Development Company was formed and directed by a group of responsible Filipino business men, including the late General Lim, Fernandez Hermanos, Pat Hoover and others. Subsequently, Don Andreas Soriano, one of the leaders in the islands, acquired control. It is reported that he interested certain individuals and companies in California to the extent of a quarter interest. It is the only private concern which now has any right in petroleum lands in the Philippines that are of any moment, and it has gone about its program of exploration and development with great vigor and efficiency.

The company first undertook to develop the Tayabas lease, in the district where Standard of California spent $1½ million on five holes, one of which was carried to a depth of a mile without bringing in production. The new company, using a local contractor operating with modified water-well equipment, found a small amount of oil in upper strata but was unable to get down to the deeper horizons looked to for larger production. It was then that Soriano and the new interests came into the company. A modern rig, designed to drill to 4000 feet was purchased in California, a drilling crew brought over and testing of the large Daanbantayan structure in northern Cebu was undertaken.

Oil for Industrialization

Meanwhile, other changes were taking place. When the leases were cancelled, President Quezon and his advisers began to search for a more satisfactory method of developing the petroleum resources of the islands or at least determining whether or not there were any such resources. He felt, soundly enough, that in the absence of any large amounts of coal, a situation then fairly well determined, almost the only hope of success with any large program of industrialization of the country, lay in the finding of oil or gas. The presence of seeps and other indications and the successful development of oil fields in the Netherlands East Indies to the south and of important gas fields in Taiwan to the north, made this hope reasonable. Major difficulties lay in the road. The constitution and public opinion made it out of the question to follow the usual procedure and negotiate a large lease, yet it was apparent that only a large area would justify the expenditure that probably would be needed to prove the territory. It was equally impossible to follow another common procedure, that of granting a number of small leases which might later come under a joint management and drilling program by the process of giving interests and overriding royalties in return for wells. There was also some sentiment which needed to be taken into account favoring nationalization of the whole business. There was further anxiety abroad as to just how efficient a wholly Filipino government would be and therefore what would be the status of investors as to future taxation and regulation. Finally, the confiscation of petroleum properties in Mexico and Bolivia had introduced a strong feeling of distrust between American companies and Spanish-American governments.

Despite all these difficulties the national importance of finding petroleum in the Philippines was considered sufficient to warrant making an attempt to find a way.

In 1937, conversations were held in New York between the President, Yulo and members of the executive committee of Standard Vacuum Oil Company which has a market organization in the Philippines and had shown definite interest in possible production there. These preliminary conversations proved auspicious and negotiations were transferred to Manila and early in 1938 a proposed contract was submitted by the President to the National Assembly for ratification. The subject was new to most of the assemblymen and too complex to be digested in the short time available. After public hearings, the assembly, instead of ratifying the particular contract, passed Act 351 establishing a new national policy as regards petroleum lands and authorizing the President to call for bids for their development and to approve and submit for ratification by the next National Assembly any resulting contract drawn substantially along the lines already negotiated. The significant portion of Act 351 and which stands as continuing legislation is Section 1, which reads as follows:

> "Recognizing the relationship of the petroleum and gas resources of the Philippines to its general welfare and national defense and desiring to ascertain if such resources exist in its territory in commercial quantities, and, if they exist to have the same developed as early as practicable; being convinced that the search for, and development of, such resources requiring as they do geological and geophysical examinations in large and widely scattered areas, the drilling of wells, often to great depths, and the construction of plants, buildings, storage tanks, pipe lines and other facilities, is a highly

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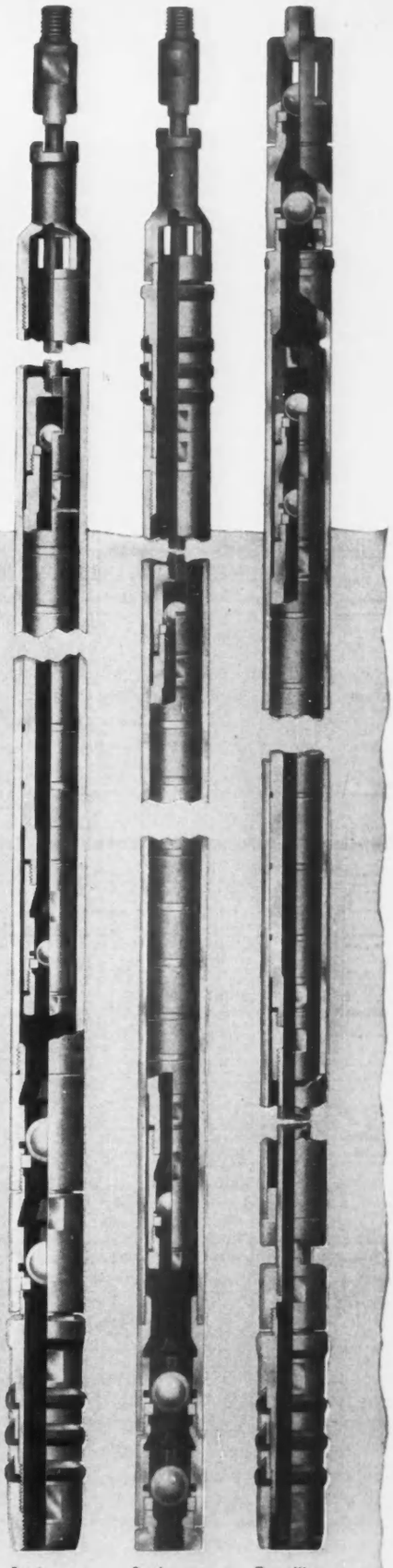

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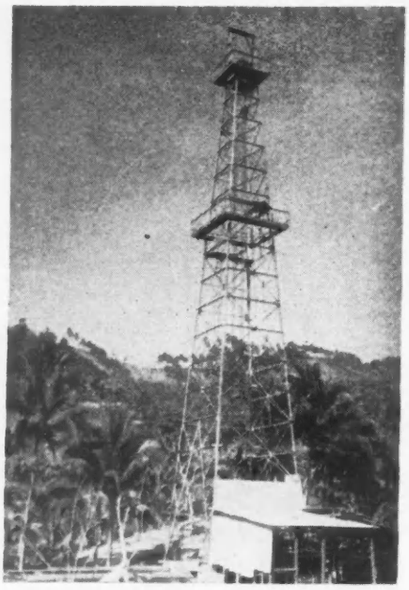
specialized, difficult, and hazardous undertaking, calling for adequate experienced technical personnel and the expenditure of large sums of money; and having observed that the efforts to discover and develop such resources in the Philippines through the issuance of leases under existing laws and regulations have not proven successful, it is declared to be the policy of the government of the Commonwealth of the Philippines to undertake the search for, exploitation, and development of the petroleum and natural gas resources of the Philippines and in such undertaking to engage and utilize the services as independent contractor or contractors, of persons or corporations who have adequate resources, experience, and organization to render such services effectively, subject in every case to the express approval of the National Assembly."



Drilling near Barili, Cebu

Call for Bids

As directed by this act a call for bids was issued and was brought to the attention of each of the American companies having interests in the Philippines. When the bids were opened in December, 1938, Standard Vacuum was the only company submitting a bid. It was substantially the same as its previously proposed contract and has been published. In brief, recognizing the national ownership of the oil and gas lands in certain large areas in the Philippines, the company proposed, with its own funds and staff, to explore and develop them as contractor for the government and to take as payment a share in the oil and gas produced or proceeds of their sale. The government agreed to protect it in exclusive temporary occupation of the tracts of land specified and granted it rights of way and other necessary privileges with certain temporary exemptions from taxation. The proposal included provision for necessary geological and geophysical surveys and carried drilling requirements, a heavy bond and other usual conditions.

A disappointing feature of the proposal was a provision that only a very small expenditure need be made until the validity of the contract has been established in the court of last resort which at the time would have been the Supreme Court of the United States. In this the legal department of the company was doubtless influenced by the Mexican and Bolivian experiences of one of its parent companies and by the rather unusual provisions of the Philippine constitution, which forbade even "utilization" of natural resources by any corporation of which less than 60 percent was owned by Filipino citizens. The government was entirely willing to have the validity of the contract passed upon by the courts and offered to cooperate in securing a declaratory judgment from the Supreme Court of the Philippines, an action which would have caused no material delay. Neither the President nor his advisers, however, would recommend acceptance of any contract which would tie up all or nearly of the petroleum lands for an indefinite period while litigation dragged through the courts, and with no substantial progress toward actual development. There was an honest difference of opinion here which at the time was considered irreconcilable so the contract was rejected and not submitted to the National Assembly.

Having in mind the immediate problem, and with the hope that at some later period the legal difficulties could be overcome, it was determined to see what could be accomplished through government agencies to do the work which would have occupied the company through most of the first two years if the contract had been signed. Accordingly, the Petroleum Geological Survey was organized. The National Development Company was, for administrative reasons, placed in charge and the work was carried forward rapidly. Within the two years following, the whole of the area of prospective value was surveyed and mapped in such detail as each piece seemed to require. Geophysical surveys were made in Panay, a number of favorable structures were found, and several drill sites were located and studied in detail. A report in seven volumes was compiled for the confidential files of the government and an eighth closing volume was being copied when the invasion by the Japanese stopped everything and scattered the records.

The Far Eastern Oil Development Company found, unfortunately, that the beds under the Daanbantayan dome had thickened unprecedently. Accordingly, having gone down 4000 feet without reaching the zone in which oil was expected to be found, the drill was sold to the National Development Company to test a shallow structure near Barille, also in the island of Cebu. The Far Eastern brought over a much heavier rig and started a new hole. When the invasion took place this new hole was down to 8300 feet in the hoped-for horizon. Such a showing was made that orders were issued December 4 to pull back to 8250 feet and make a test. Four days later the war began and the rig and camp were destroyed on orders from the Army to prevent the equipment and supplies falling into the hands of the enemy. The same fate befell the rig at Barili where, at the time, the drill was working at 2200 feet in limestone overlying the presumed oil horizon. Both companies were fortunate in that most of their American employes got out, some getting home in advance, some joining the Armed forces or the guerrillas and some being interned. So far as is known only two of the Far Eastern staff were killed. One of the government geologists died in prison in Japan.

Such is the present situation. In the course of the geological survey, the relations of Philippine geology to the Netherlands East Indies was worked out and some of the productive horizons of the Indies were recognized in the Philippines. A number of structures judged worthy of test by drill were located. Operations of the old leasing law, at first suspended for five years, was extended another five years in 1944, and all petroleum lands are now reserved. National Development Company has been given the right to enter and operate this reserve but since the recovery of Manila it has not been reactivated and it is uncertain what action will be taken to put into effect the policy established in 1938.

President Osmena has stated that any legislative body to be effective must have a fresh mandate from the people and an election is expected in April. Whether the government will issue a second call for bids or attempt to save time by developing through private negotiation a contract to submit to the Philippine Congress (as it now is) for approval, does not yet appear. It is to be expected that Far Eastern Oil Development Company will proceed with its own operations as soon as rig and crew can be assembled.

China's *Oil* Policy

"WHAT measures are being taken by the government to develop the petroleum industry in postwar China?"

"What is the future petroleum policy of China?"

People in the United States have often asked these questions and other similar ones of the Chinese who are studying petroleum engineering in this country.

The answer to such questions may be found among the several statements made by high ranking government officials of China.

The first such statement, which in part is an answer to the questions of interested persons in the United States, was made by Chiang Kai-shek, president and generalissimo of China, when he was interviewed by Henry La Cossitt, editor of Collier's Magazine in October, 1945. One of Cossitt's questions dealt with whether China's postwar industrial development would rely on state control or private enterprise.

The Generalissimo's answer to this query:

"In December of 1944, the Supreme National Defense Council adopted general principles for economic enterprises during the first period of reconstruction. This plan fully encourages private enterprises, with the scope of the principle of restriction of capital construction. The postwar industrial development of China will be carried along these two lines — by private enterprises and by state enterprises.

Limited Monopolies

"The principles adopted by the Supreme National Defense Council also provided that the kinds of state monopolies should not be too numerous. Such monopolies include postal service and telecommunications, arsenals, mints, principal railroads and large scale hydraulic power plants. Private capital may engage in any enterprises other than state monopolies.

"In a nutshell, the purpose of Chinese economic reconstruction is to realize the economic system of the 'Three Principles of the People' through the development of a planned free economy."

By K. C. LU*

Secondly, the Chinese News Service furnishes this authoritative statement of China's postwar economic policy, with reference to foreign investors, as presented by Doctor Sun Fo, son of Dr. Sun Yat-sen, and president of the Legistative Yuan:

No Curbs

"No restriction will be placed upon the percentage of foreign participation and management of Chinese companies.

"Technicians may be brought to China to assist in the development and operation of industries in which foreign capital is invested.

"Foreign nationals, in corformity with Chinese law, may establish branch factories, branch business houses and independent business enterprises in China.

"There will be no discrimination in the matter of taxation as between Chinese and foreign nations.

"The government may grant special charters to foreign interests for undertaking important enterprises in China."

Lastly, in another statement, Dr. Wei Tao-ming, Chinese ambassador to the United States, said:

"The people of our two countries are peace-loving by nature. With our traditional friendship strengthened on the battlefield, we will make the best of partners in the peace to come. When the future peace is established, you will agree with me that this cooperation will extend immediately to the economic and other fields, because not only have we no conflict of interests but all our relations are of mutual benefit and the prospect before us is unlimited. The United States is one of the most advanced industrial countries in the world. China has a large population with her vast natural resources to be developed.

Opportunity For U. S.

"For China there is the need of financial and technical assistance from the United States. For the United States there is opportunity for your industry, capital, and technical skill. Thus, the complementary nature of our two economies will make possible substantial contribution to your prosperity and our development."

It may be noted that the above statements had nothing to say about petroleum. Yet, petroleum was not included in those of state monopolies. Therefore, it may be said definitely that the petroleum industry will be developed under private enterprise.

After long disunity, resulting from constant civil war before 1930, followed by eight years of bitter fighting and tight blockades by Japan, it is only to be expected that China will have difficulties in the economic and financial fields.

Assistance is needed and will be warmly welcomed, particularly by the United States, and will not only permit the government to function effectively, but will enable China to play a leading role in the solution of problems presented by the defeat of the Japanese.

Saratov Development

The director of the Saratov Gas Trust recently declared that under the new Russian Five-Year Plan (1946-1950) the natural gas industry of the Province of Saratov will undergo "speedy development."

During the first three months of 1946 the sites for 122 wells have been staked and nine of the tests are already drilling, the director stated.

"The plan envisages prospecting for natural gas in nine areas while two are now being exploited and the various areas will be linked by a gas pipe line of more than 300 miles," he said.

* K. C. Lu is one of the petroleum engineer students from China now training in the United States.

IRAN

FUTURE MOSCOW PUPPET?

By HENRY OZANNE

RUSSIA'S aims of aggrandizement in the Middle East have been heightened, not checked, by the current Iranian-Soviet dispute in the United Nations Security Council, in the opinion of many petroleum industry observers. These sources see Moscow determination to extend its military and political domination over bordering nations as now being pushed to the south in Asia as well as over neighboring European countries.

The first future play in such a strategy, some industry officials suggest, will be Russia's packing of the Iranian parliament in June and the virtual conversion of that country into another Moscow puppet-state. In support of this fear, the following evidence is cited:

1. Internal disturbances in Iran are mounting, and much of this unrest apparently is Russian-inspired, such as the recent rioting in South Persia, the revolt of the Azerbaijanians, and the uprising of the "Independent Kurdish Republic" forces who openly admit they have been supplied Russian arms and equipment in northwest Iran and that Russian technicians have arrived in that region to train tribesmen for a drive in behalf of a "free Kurdistan."

2. Weakening Iranian resistance to Russian political pressure. This was seen in Teheran's withdrawal of its complaint from the Security Council and in reports that Hussein Ala, Iran's delegate to the United Nations sessions in New York, is already "on the way out" in an effort to placate Moscow.

Oil A Red Herring

If this view of Russia's concern in the Middle East is correct, then oil is merely the temporary pretense of her maneuvers there. In fact, one highly placed oil industry official frankly told the press last week that "oil is the red herring which Moscow is using to distract attention from her march to the Mediterranean." He reviewed the history of the Iranian oil issue to prove his point:

"Russia, like the United States, has never in the past been compelled to look beyond her own borders for petroleum. Britain was so compelled and nearly half a century ago acquired her first oil concessions in Persia. In 1901, when William K. D'Arcy obtained the original concessions in Persia, no one even made an offer against him. Why is Russia pretending to wake up to the fact of oil in Iran 45 years later?

"And why does Russia create the misimpression that the British hold a monopoly on Iran's oil resources? British concessions actually cover only 1/6 of the country's area, and there remain vast unallocated petroleum deposits available through Russian negotiations."

He also pointed out that economic experts attached to the United States and British delegations to the Security Council sessions in New York conceded it would be uneconomic for either American or British companies to attempt to exploit the great oil strata starting in the Baku area of the USSR on the Caspian Sea and running down through Iran and Iraq to the head of the Persian Gulf. "To do so," he said, "is not feasible because of prohibitive costs of pumping and otherwise transporting oil over the mountains of Northern Iran to the Persian Gulf refineries or the pipe lines leading to the Mediterranean."

Another industry representative points out that Soviet expansionism cannot be explained wholly, or even chiefly, by a need for oil since Moscow has known by the terms of the Yalta Conference that she could negotiate for Iranian oil. He sums up Russian policy throughout the Middle East under a threefold goal:

1. Military strategy. Turkey and Iran are the weak spots in the Soviet frontier. The Caucasus mountains between the Black and Caspian Seas practically cut off three Russian republics from the rest of the USSR—Georgia, Armenia and Russian Azerbaijan. This part of Russia — Transcaucasia — contains the chief part of the Soviet Union's oil resources. Acquisition of Iranian Azerbaijan would give Russia greater frontier security by placing her border beyond the mountains and permitting quick movement, if necessary, into Iran and Iraq.

2. Political domination of the border nations. In her "push to the west" Russia appears intent on making satrapies out of intervening states. Her political pressure is now exercised far beyond any immediate territorial outposts. It is enough to recall that Russia has asked for joint control of the Dardanelles, for a mandate over Tripolitania, and for a place in the Dodecanese Islands between Greece and Turkey.

3. Natural resources, particularly oil. This in reality is a minor objective to the other two.

But whatever Russia's needs or aims in Iranian oil, the present controversy over those resources caps a long and troubled petroleum history in that country. After the original D'Arcy concessions were obtained in 1901 (without assistance by the British government, incidentally), little production was recorded in Persia until the first world war, although the first gusher was brought in by 1907. After the discovery of oil in Persia, 39 years ago, the D'Arcy interests merged with the Burmah Oil Company to form the Anglo-Persian Oil Company (renamed the Anglo-Iranian Oil Company in 1935). In 1913 the British government acquired half of the 4 million pounds capital of Anglo-Persian, and at the present time is reported to own a controlling interest in the Anglo-Iranian company.

Russia traces her claim to Iran's oil back to 1907 and a treaty signed that year with Britain under which Persia's northern provinces were assigned to Russia's "sphere of influence." In 1916 a Russian operator, A. M. Khostaria, secured a concession in the northern provinces, but on the advent of the Russian revolution this grant was disposed of to the Anglo-Persian company.

By the treaty of 1921 between the Soviet Union and Persia, Russia relinquished all rights and concessions previously obtained under the czars, but with the proviso that none of the surrendered concessions could be granted to any non-Persian operators without Soviet consent.

In 1920 a Persian government headed by the present Premier Ghavan granted Standard Oil Company exploratory rights in North Iran, an arrangement which was protested by the Anglo-Persian company on the ground that it had acquired the old Khostaria rights. British and American companies agreed to share the northern Persian territory and so prompted a protest from Russia which sent a commission to Teheran. Iran reviewed the case and decided in favor of Russia.

Shortly thereafter, Persia granted a non-transferrable concession to Harry Sinclair, but that transaction was later annulled.

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■ CONTINUED ON PAGE 48
(ALSO SEE MAP ON PAGE 32)

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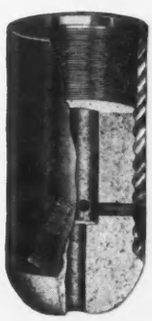

Where bridges, or other formation obstructions are likely to be encountered, this Guide Shoe is used in combination with a Baker Cement Float Collar (above). The Wash-Down Whirler Guide Shoe then safely guides the casing past any wall irregularities, washing the side walls, breaking down bridges, and preparing the hole for a good cement job. When cementing is commenced the Guide Shoe whirls the slurry to uniformly encase the pipe.

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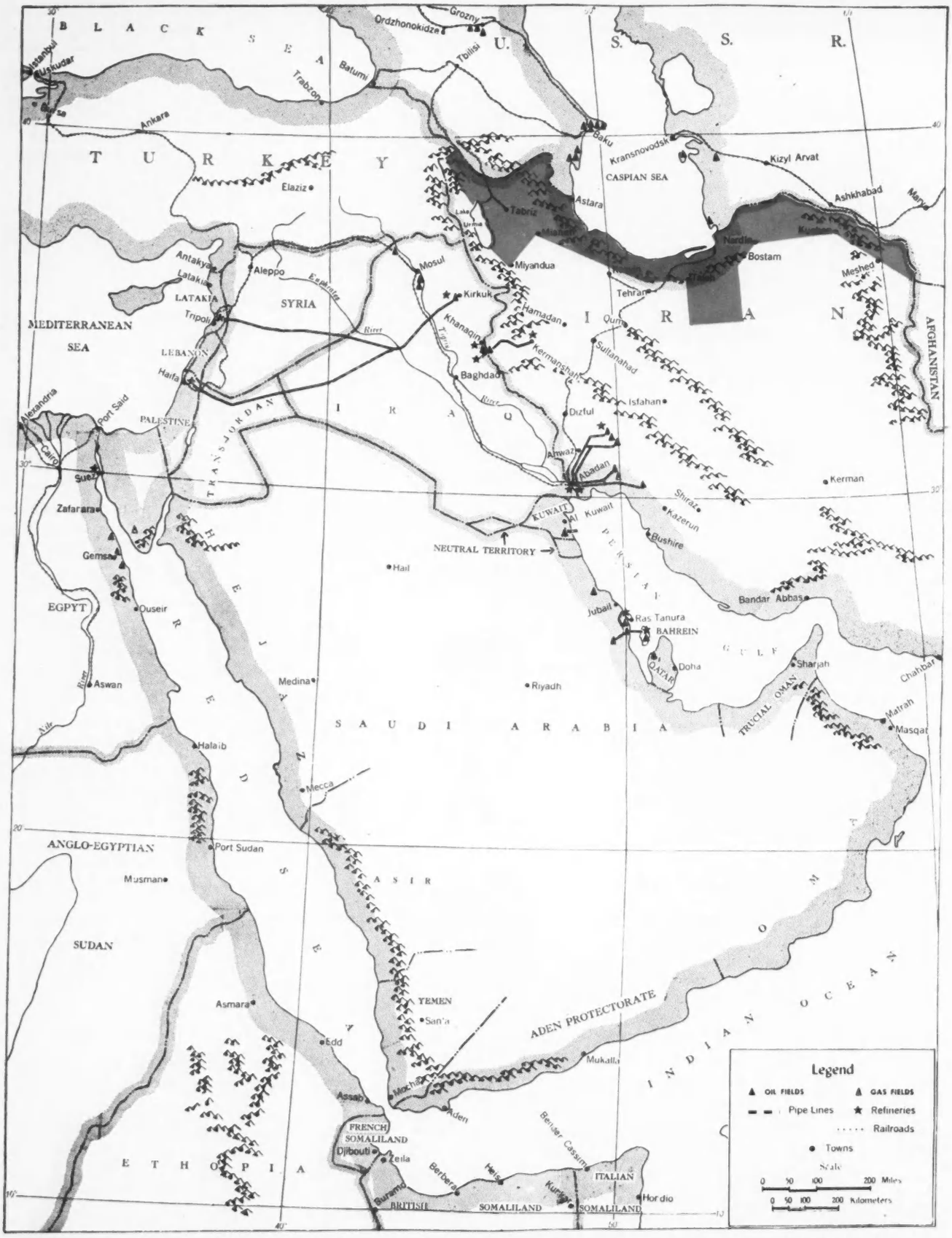
Guiding, Floating and Cementing EVERY String of Casing



The approximate boundary of the new Soviet oil concession in Iran is shown in color on the accompanying map of the Middle East area. It extends clear across the northern edge of Iran, varying in depth from 50 to an average of 100 miles, with some sections having greater thicknesses. This whole area adjoins the U. S. S. R.

From the extreme northeastern tip of Iran, the southern boundary of the Russian concession runs southeast to Lake Urmia, thence southeast another 50 miles to the town of Miyandua, then turns northeast to the town of Nianeh, from which point it runs in a general southeastern direction to Puhl (which is 46 miles north of Teheran), then east to Taleh, then directly south along the 53rd Meridian to 34.15 degrees, then east to the 55th Meridian which it follows northward to near Bostam before turning northeast to the town of Nardin, thence east to the town of Kuchan (Qustan) where it turns southeast to pass just north of Meshed and continues on to intersect the Iran-Afghanistan-U. S. S. R. boundary at their three-way junction point.

Geology

OF ALASKA NAVAL RESERVE

By WILLIAM T. FORAN
Lieutenant Commander, C.E.C., USNR, Geologist in Charge

IN 1922, two brief reconnaissance expeditions to the coastal Barrow region were made under the direction of Max Steincke and Harry Adams, representing major oil companies of California. Their interest in the region, however, was dampened when, in February, 1923, President Harding, acting on the advice of the Bureau of Engineering, Navy Department, set aside an area of some 35,000 square miles to be known as Naval Petroleum Reserve No. 4.

Situated in northern Alaska, the area is bounded on the west by a line running from longitude 161°50′ due south to the Colville—Noatak water divide, thence along the crest to the headwaters of the Noatak River, from there due north to the junction of the Etivluk with the Colville, and down the Colville's left bank to the Arctic Ocean, its northern boundary.

Although the earliest geological work done in or adjacent to this area was by F. C. Schrader (Professional Paper, 20 U.S.G.S. 1904) and another expedition led by Arthur Collier (in the Lisburne-Corwin area, Bulletin 278 U. S. G. S. 1906), actual petroleum geologic study was not inaugurated until the U.S. Geological Survey began a reconnaissance study of the area in the summer of 1923, extending its work through 1926, by which time no less than seven separate field parties had studied the region. For their persistence and determination in the early exploratory work, especially with the equipment and transportation available at that time, those geologic parties are due much recognition.

Due to the tremendous drain of World War II on our continental reserves, attention was again directed in August, 1943, toward Northern Alaska to the vast, undeveloped Barrow Basin. Until March, 1944, when the Chief of the Bureau of Yards and Docks, acting on instructions from the Secretary of the Navy, and in conjunction with the director of Naval Petroleum Reserves, initiated action for a reconnaissance party to go to Naval Petroleum Reserve No. 4, the fundamental objective for which the area was intended, a source of petroleum for strategic purposes had not been adequately established. The purpose of the reconnaissance was:

(a) To determine the most advantageous means to further geologic study of this area, i.e., field mapping, aerial photography, structure core-drilling, geophysical study (seismograph, gravity meter and airborne magnetometer) or a combination of those various phases.

(b) To determine the mechanical difficulties which might be encountered in the event an expedition to drill oil wells were moved into this area.

(c) To gather as much information of a general nature concerning all aspects of life in the Arctic, meteorology, ground conditions, population, character of the natives, and any other information of critical nature which might be of use or interest in the development of a movement to Reserve No. 4.

Survey Conclusions

The party left Washington, D. C., March 16, 1944, and returned to Washington April 25, 1944. On completion of the brief reconnaissance the principal conclusions were:

(a) A petroliferous area of indicated major importance exists within the limits of Naval Petroleum Reserve No. 4.

(b) Stratigraphic and structual feature favorable to the accumulation of oil in commercial quantities, and the presence of active oil seepages closely related to those features, lend additional support of the strongest character to the probability of exploratory success.

(c) The course of exploration, development, and producing operations is amenable to the standard practice adopted by the leading operators in the Rocky Mountain areas from northern Wyoming to Norman Wells in the MacKenzie River Basin of northern Canada.

(d) Should a reserve of recoverable oil of sufficient volume be developed, neither the climinate nor topography will act as a barrier to the economic installation and operation of an adequately planned pipe line system.

An important contribution on Petroleum Reserve No. 4 geology by the organizer of the Navy's extensive 1944 reconnaissance study.

On June 1, 1944, a second expedition was dispatched to investigate the Umiat Mountain area on the Colville drainage in the southeastern part of the reserve. The result of this expedition was the establishment of a 40,000-acre block with some 650 feet of closure on a well defined anticline with low arch and symmetric profile. Along the crest near the Colville crossing several oil and gas seepages were investigated and samples taken. Analyses showed an oil of naphthene base, and extremely low viscosity with a pour point of —50° F.

After plan, profiles, and structure maps were developed, a test site, Umiat 1, was spotted near the crest of the dome. During the following winter a rotary rig of 6000 feet capacity was transported from Barrow to the location (THE OIL WEEKLY, December 7, 1945). A drilling camp at the rig site, and another subbase camp seven miles east at the Colville, where a 5000-foot air strip was constructed, were completed.

On October 12, 1944, acting under further orders from Vice Admiral Ben Morreel, chief of the Bureau of Yards and Docks and working under the direction of Commodore William Greenman, director of Naval Petroleum Reserves, the writer was given the assignment of organizing a geologic staff (Navy personnel) of adequate capacity and ability with which to complete a field geologic, geophysical and photogrammetric reconnaissance study of the potential oil possibilities of the eastern part (Cape Simpson to Umiat) of Naval Petroleum Reserve No. 4 in northern Alaska.

Officer personnel for five surface geologic parties, one seismograph party and two complete gravitymeter parties were assembled at Seattle, and dispatched to Point Barrow during April and May.

The seismograph exploration work was contracted to the United Geophysical Company of Pasadena, Calif., which furnished the instruments and technical personnel to make a reflection seismic study. The Navy placed Lieut. Ernest J. Marti at Camp Simpson to supervise

the program, with A. J. Legge of the contracting company as party chief.

All geological and geophysical parties took the field June 1. Aerial photography was in active status July 1. All programs were completed, and the parties demobilized September 1, and returned to Fairbanks, Alaska, for development of plates and reports, thence to Washington, D. C., for separation or further assignment.

The object of the program was to gather all available structural and stratigraphic information related to the conditions controlling migration, accumulation, and a logical explanation for the numerous petroleum leakages over such widely spaced areas. Although the occurrence has been known, and the seepage residue exploited for many years, until the inauguration of development by Navy Construction Battalion Detachment 1058 (Sea Bees) at Point Barrow, August 6, 1944, little attention had been given to its potential petroleum possibilities.

Topography and Drainage

The southeastern part of the reserve, (Umiat district) studied during the summer by the Navy field parties is, physiographically, the northernmost extension of the plateau area. Its topography, moderately weak, consists of a slightly-folded to tabular, irregular-directed type in which the summits give an appearance of nearly constant elevation. With the exception of Umiat Dome, where the inner structure coincides with the topography, and the massive Umiat sandstone (Upper Cretaceous) makes two flank, strike-ridges, the general dissected attitude prevails. The erratic pattern is due, no doubt, to the low-arched and tabular aspect, a setting decidedly unsuited to the differential type of erosion common to regions (adjacent to the south) of a steeper-dipping strata. The area, completely tundra-covered, and with a scrubby growth of willow, dwarf birch (buck brush), and alter brush along the stream courses, is drained by two trunk streams and their tributaries. The Colville, skirting the south and east limits of the area, takes care of the southeast half of drainage. The Ikpikpuk, with Maybe Creek and the East Fork as major tributaries, takes care of the northern and northwestern part of the runoff.

From the northern limit of the plateau area, about latitude 69°45'N, to the Arctic coast, stretches a nearly-featureless, lake-dotted plain, composed of an elevated series of unconsolidated quaternary marine strata.

Geology of Region

Although the geology of the region appears quite simple, faulting, and a moderate amount of folding, have complicated the structure so much that mapping is accompanied with some difficulty. The principal difficulty, at once, is found to be the widespread occurrence of tundra and residual debris which tend to obscure, and frequently completely conceal the nature and distribution of the underlying rocks. North of latitude 69°45'N a quarternary mantle of marine origin, as well as the products of stream alluviation occur. They are exposed in the steep banks of the Ikpikpuk, Meade, and lower Colville. Locally, these recent marine deposits, as experienced by the field geologists, are not easily distinguishable from the later reworked stream deposits.

The plateau area is underlain, dominantly, by rocks of Upper Cretaceous age. The lithologic character and alternating aspect of these rocks, including the 1816 feet of beds penetrated in the well, gives the impression that in a basin of normal concentration, strata of sand, clay, silty clay, and thin pebble conglomerates were deposited under frequent oscillation cycles of elevation and submergence, causing the characteristic alternating appearance of shallow and deeper water sediments. Some of the sands contain considerable arkosic material, others show abundant subangular to rounded grains of varicolored chert. Impalpable pyroclostics (unaltered) and frequently their completely altered derivatives, bentonite, with occasional thin beds of coal, appear throughout the section studied. No metamorphics or evaporites have been recorded in the exposed formations.

The combined observations of the five Navy field parties, and those of three parties of the U. S. Geological Survey studying separate localized areas to the south of the reserve, reveal that a nearly complete Cretaceous section of at least 35,000 feet of marine sediments were deposited in the Barrow Basin. The section as observed, especially within the uppermost 12,000 feet, includes multiple sands of excellent porosity and permeability, with occasional zones of overlap facies.

Numerous settings, suggesting structure favorably suited to the localization of oil in economic volume, occur throughout the area examined, with several anticlines extending well into the adjacent areas flanking the reserve.

Region's Structure

The association of oil and gas seepages with localities where the structure of the containing rocks appears favorable for pooling as with the Barrow Basin, readily suggests the importance of understanding the origin and mechanics of those structural features. Although lack of sufficient subsurface data (well logs, etc.) causes room for much fantasy and a wide diversity of opinion regarding concealed or buried structure, there are still many suggestions that the pre-Cretaceous tectonics, and recurrent movement along similar zones of weakness, affected the basement in the reserve and adjacent areas quite as severely as that visible on the north flank of the Brooks Range.

To suppose that the controlling forces were transmitted by the incompetent Cretaceous beds over a distance of 200 miles is unthinkable, for the pressure would, undoubtedly, have been relieved by smaller adjustment, secondary structures in the area not remote from the source (Brooks Range). Then it is apparent that some other tectonic aspect must be introduced. The indurated Triassic and Paleozoics, forming the basement complex, are fully competent to transmit stresses over considerable distances, especially when overlain by an extremely thick section of sediments. Then it appears that the visible structure in the Cretaceous is the natural surface expression in the weak rocks overlying an extensive series of faults or shear zones in the Paleozoic basement rocks.

The foregoing postulation was adequately substantiated by an intensive study of aerial photography (trimetrogon), and during the recent geophysical program when the reflection seismograph, gravity meter, and core drill data agreed, showing unmistakable evidence of faulting and a mixed structural control, all intimately related to the oil and gas seepages at Cape Simpson, about 225 miles north of the Brooks Range.

Summary of Conclusions

The Cretaceous rocks of the region are underlain by a Devonian, Mississippian, Triassic basemnet. It is an established fact that Devonian and Mississippian rocks in the adjacent northern regions are known to be of prolific petrolifierous nature. The Barrow Basin, although only a remnant of the great Arctic geosyncline, contains nearly 750,000 cubic miles of sedimentaries of marine origin, Silurian through Cretaceous. It is apparent also, that all charted seepages are impressive surface manifestations of presumed accumulations on the rim of the basin and of reservoir beds, most assuredly, within the Upper Cretaceous.

The Upper Cretaceous, as studied in the Umiat region, from 2500 feet to 10,000 feet, contains a zone with numerous porous and permeable sands associated with thick courses of laminated shale. Several zones of overlap facies, and one of significant angular discordance, appear in the Upper Cretaceous section.

All seepages are subsequent to, or re-

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Royalty Called Flexible By Saskatchewan Official

Present royalty rate wil not be allowed to act as a handicap to new mineral developments in Saskatchewan, Natural Resources Minister J. L. Phelps has declared.

"This royalty is a flexible rate and any time it is shown to operate to the detriment of a company, individual adjustments could be made," Phelps said.

A resident geologist for northern Saskatchewan will be appointed to assist prospectors. Mining companies requested the department to press the Goelogical Survey of Canada to carry out scientific mapping at an accelerated rate.

New Oil Discovery in Italy

Recent reports from northern Italy say a new oil discovery has been made in Piacenza Province, so far the only area in Italy where oil has been produced in commercial quantities. Although these meager reports say that the yield of the well is expected to rise to something like a third of the country's production the extent of the discovery has not been confirmed.

Wildcat Completions Total 15 Last Year in Eastern Canada

Wildcat completions in Eastern Canada during 1945 totaled 15 with all the exploratory tests being dry and abandoned.

Imperial Oil Company, Ltd., drilled 11 of these tests and was part owner in another operation. M. Stobie, an independent, drilled three dry holes—two in Simcoe County and one in York County.

A majority of Imperial's tests were drilled in Kent County with the deepest being drilled to 3685 feet which bottomed in granite.

See the table below which gives the complete record.

Eastern Canada Activities

Cities Service Oil Company and Socony-Vacuum Oil Company's Hillsboro 1, Prince Edward Island, shown above, drilled 2000 feet of salt before stopping at 14,700 feet. Construction of the rock crib island from which the well was drilled was necessary because of rough weather conditions and an 18-foot variation in tides.

Meanwhile, Sun Oil Company's plans for a wildcat operation in Nova Scotia some time this spring or summer was expected to be watched with considerable interest as a comparison with the Cities Service's well. Plans are not yet complete as to the exact location of the Sun operation, but the well is to be drilled somewhere in the vicinity of the town of Amherst, across Northumberland Straits from Prince Edward Island. It is reported to be a deep test to the Mississippian or very nearly so.

The Cities Service well is one of the deepest wells ever drilled outside the United States.

Cuban Imports

Imports of petroleum and products into Cuba during 1945 according to preliminary figures were 568,130 barrels of crude oil; 394,625 barrels of gasoline; 7,257,082 barrels of fuel oil, and 132,601 barrels of other petroleum products. The United States was the major source of all the imports.

Eastern Canadian Wildcats Completed in 1945

State and Township	Company, Well and Location	Date Completed	Total Depth. (Ft).
Elgin County, Aldborough Tp.	Imperial Oil Ltd. Sznydler No. 1, 1 mile east of Rodney, Ontario	8-15-45	495
Kent County, Chatham Tp.	Union Gas & Imperial Oil's Carroll No. 1, 3 miles sw of Chatham gas field	12- 6-45	3685*
Kent County, Dover Tp.	Imperial Oil's Lazon No. 1 3 miles north of Dover gas field	9- 5-45	539
Kent County, Harwich Tp.	Imperial Oil's Bokar No. 1, 4 miles southeast of Blenheim, Ontario	8- 4-45	746
Kent County, Harwich Tp.	Imperial Oil's Ferguson No. 1, 4 miles east of Chatham, Ontario	11- 6-45	1738
Kent County, Harwich Tp.	Imperial Oil's Haggart No. 1, 4 miles east of Blenheim, Ontario	11-21-45	625
Lambton County, Moore Tp.	Imperial Oil's Smith No. 1, 4 miles south of Sarnia, Ontario	12-27-45	850
Kent County, Orford Tp.	Imperial Oil's Cowan No. 1, 4 miles south of Bothwell field	9- 7-45	551
Kent County, Orford Tp.	Imperial Oil's Prokopchuk No. 1, 4 miles southeast of Bothwell field	12-15-45	594
Oxford County, South Norwich Tp.	Imperial Oil's O'Brien No. 1, 4 miles northwest of Delhi, Ontario	12-24-45	1140
Lambton County, Sombra Tp.	Imperial Oil's Van Domme No. 1, 12 miles west of Oil Springs field	11-10-45	820
Kent County, Tilbury East Tp.	Imperial Oil's Renwick No. 1, 1 mile west of Tilburg gas field	11-16-45	516
Simcoe County, West Gwillimbury Tp.	M. Stobie's Roberts No. 1, southwest of Lake Simcoe	7-26-45	920
Simcoe County, West Gwillimbury Tp.	M. Stobie's Hawbly No. 1, southwest of Lake Simcoe	12-20-45	780
York County, East Gwillimbury Tp.	M. Stobie's Dean No. 1, south of Lake Simcoe	1- 5-45	835

* Bottomed in Granite. **Note:** All tests were dry and abandoned.

Goes to Egypt

Gordon Loud has been appointed Middle East representative of The Atlantic Refining Company, and has gone to Cairo, Egypt, to open headquarters. He joined the company last February 6 and is spending some time in Naples and Alexandria with his family before beginning his survey of petroleum activities in the turbulent oil situation of the Middle East.

Gordon Loud

Loud is an archaeologist of many years experience and recently was released by the Office of Strategic Services in Washington where he served during the war. He was graduated from the University of Michigan in 1922 and from the Harvard Business School in 1924 and the Harvard School of Architecture in 1928.

In 1928 and 1929 Loud was field archaeologist on an expedition for the University of Michigan in Egypt. From 1929 till 1942 he was on a similar expedition for the University of Chicago in Egypt, Iraq and Palestine.

Show of Oil Is Reported in Wildcat Test South of Suez

Anglo-Egyptian Oilfields, Ltd., has announced its wildcat test at Sudr in the Sinai Peninsula, about 40 miles south of Suez in Egypt, has picked up a good show of oil at about 2700 feet. Testing operations are reported underway.

Poland Has Only 30 Percent Of Its Pre-War Oil Fields

M. Kuminski, Polish Vice Minister of Industry, in a recent statement referred to the fact that only some 30 percent of the oil fields of pre-war Poland are situated within Poland's present boundaries and that these fields had a pre-war output of about 890,280 barrels. He said that test wells are to be drilled in the foothills of the Carpathian Mountains, in the Province of Kielce, as well as in the former German Province of Pomerania.

During January, 1946, crude oil production from Poland's oil fields is reported to have totaled about 67,480 barrels.

Observers Believe Change in Mexico's Petroleum Policy May Be Forthcoming

INTERESTED observers are forecasting possible changes in official Mexican policy under which Mexico would be willing to authorize petroleum development by foreign capital, especially American companies. Indications of such a swing in official policy have been accumulating during the last few months, particularly in connection with the forthcoming national elections in Mexico.

Only last August reports that "American capital and technology will cooperate in the exploitation of Mexico's oil," brought strenuous denial from the Mexican government that any foreign participation in Mexico's petroleum industry was contemplated. But recently such denials have not been raised to similar reports. For instance, Carlos Denegri, writing in the *Excelsior* of Mexico City January 26, 1946, went virtually unchallenged in his statement that "a petroleum agreement is unavoidable—let us be prepared to receive it with common and realistic sense." This statement added:

"Approximately three years ago this reporter in this same column said that the expropriated petroleum companies and the government of Mexico would have to arrive at an agreement which respected the constitutional principle of direct domination of the nation over the oil fields, and at the same time would permit the companies the exploitation of same.

"It was evident that the investment of capital required for petroleum exploration is of such importance and represents such a percentage of the total investment, that our government would be handicapped to practice it in the measure demanded by new scientific developments. It was evident as well that the formulas of those scientific developments, which completely change the economics of this important industry, were and are a property of the principal petroleum companies of the world.

"Above all, it was evident that demagoguery was not going to move the Mexican petroleum, and the only thing we had was that—demagoguery. Therefore, one of the principal problems of the next government of the Republic is exactly that one: to reach an agreement with the petroleum companies that will not harm our national pride and is not against our labor laws.

"We must agree right now that it is preferable to share the world's benefit of our participation in the petroleum 'global' market, than to go down another step into our economic misery and stubbornly hold, unreasonably, for demagoguery."

An even more official pronouncement was made recently by Jerome S. Hess, American international lawyer who has been acting as attorney for the Mexico government in all its legal matters in the United States. In the Mexico City *Herald* of March 26, 1946, Hess was quoted as revealing that "first class U.S. companies are making substantial investments in Mexico in combination with Mexican capital." He said:

Mexican Control Clarified

"I want to correct a popular misapprehension regarding American investment in Mexico, and that is that companies organized here must have 51 percent control among Mexican citizens. That requirement does not exist in the law which merely states that for special circumstances such a requirement could be enforced, but it is not enforced except in a few special industries, such as motion pictures."

The issue of the re-admission of American oil companies into Mexico, as well as the whole problem of Mexican petroleum policy, has been raised in connection with the Mexican presidential campaigns now under way for the June elections. Both presidential candidates, Miguel Aleman and Ezequiel Padilla, have declared they are in-

Exploration in Nigeria Expected to be Resumed

Dr. F. Dixey, director of the Geological Survey of Nigeria, in a lecture recently delivered at the Imperial Institute in London, indicated that Anglo-Iranian and Shell intend to resume their exploration activities in Nigeria which were interrupted during the war.

Prior to the war, the two groups jointly made a search for oil in the southern part of the country north of Port Harcourt. The result of this exploration has not been made known, but Dr. Dixey added that in view of the occurrence in this area of a great thickness of gently-folded Cretaceous and Tertiary sediments of marine and shallow water origin, it was reasonable to suspect the presence of oil, although it need not necessarily be present in commercial quantities.

terested in reorganizing the Mexican oil industry, particularly for the purpose of discovering new producing lands. Aleman, backed by the present administration as well as by the labor unions, declared in a statement published in *El Universal,* September 30, 1945:

"The expropriation of the foreign petroleum companies and the exploitation of this industry by the State, are one of the revolutionary steps which have been unanimously approved by the Mexican people.

"We must not only take care of the present state of this industry by using more modern methods, but also plan for its future. Not only the exploration of the present oil regions is required, but exploration should be extended to wildcat zones. The government should take the necessary steps toward improving the petroleum industry in relation to oil-refining. We must also build pipe lines for oil and gas for easy distribution of oil and its products throughout the Republic."

Reorganization Prospect

It is reported among American industry circles that should Aleman be elected, as is indicated, his present campaign manager, Ramon Beteta, is slated to become Mexico's "oil czar" in a reorganization program that would centralize all the country's petroleum affairs under on head and would relegate Petroleos Mexicanos (Pemex) to the role of merely passing on national requirements and production quotas.

Mexico's production is scheduled to be increased this year to a 160,000 barrels a day average, Pemex already has announced. This would be against 118,000 barrels for 1945, and 103,900 barrels a day for 1944. The stepped-up program calls for purchases of more equipment from the United States and enlarging of refineries as well as increased drilling activity.

At the rich Poza Rica field a new crude stabilization plant and gasoline absorption unit are being erected, the latter to have a daily capacity of 70 million cubic feet of gas. The Azcapotzalco refinery will soon have additional capacity of 20,000 barrels a day. A new pipe line has been projected from the Poza Rica field to Salamanca in anticipation of a new refinery to be constructed there for supplying Central Mexico. In addition there are two other refineries at Ciudad Madero and Arbol Grande and one at Minatitlan.

The deterioration of the Mexican petroleum industry was pointed out at a roundtable last autumn held at the Ciudad Madero refinery. The conference was attended by representatives of the Union of Petroleum Workers, Pemex, independent oil producers, and representatives of large consumers. It was then agreed that production must be increased, management efficiency improved, workers' conditions bettered, and more adequate transportation provided.

Believed Inevitable

It was also cited at that meeting that the Petroleum Law of May 2, 1941, in Article VI, Section 3, provides that the exploitation of Mexican petroleum fields can be handled through contracts with private individuals or companies. But Article X provides that such contracts shall be entered into with Mexican citizens, 100 percent Mexican-owned companies, and with companies of "mixed economy" in which the Government holds the majority of stock. It is still questionable how far the new administration, to be inaugurated next November, is prepared to go in modifying any of these restrictions. But some American industry leaders believe some change in the law is inevitable in the not too distant future as Mexico is threatened with inadequacy of production for meeting increased consumption. In fact, she must shortly produce more oil or import for her own needs.

Campaign of Deep Drilling Declared Probable for Cuba Within Next Year

Increased geological and geophysical activity now underway in Cuba probably will lead to a campaign of deep drilling on the Island within the next year.

Cia. Petrolera La Estrella de Cuba (Shell) is continuing to conduct core tests in the north coast area of Cuba known as the Moron Basin in the northwestern part of Camaguey Province. Estrella is reported to be planning to import a contract rig from the United States during 1946 to drill the first deep test on Cayo Coco, an off-shore island immediately north of the town of Moron. Reports indicate the proposed wildcat venture will be projected to 12,000 feet.

Standard Oil of Cuba (Standard of New Jersey) recently completed its Banos 1, located near Paso Real, Pinar del Rio Province, at 8605 feet as a dry hole. It is expected that the rotary drilling rig used on the Banos No. 1 will be started again in June or July of this year on a new location in the same area.

Meantime, Standard has imported a seismograph party and is conduction a survey over a portion of Pinar del Rio Province where previous geophysical surveys have been conducted. This work is expected to require approximately three or four months. Standard also is conducting other gravity meter and magnetic surveys with three field parties in various other sections of the Republic of Cuba.

The Atlantic Refining Company, third major foreign oil company operating in Cuba, continues to be dormant insofar as actual field work is concerned. However, Atlantic has a joint agreement with Standard in the Province of Pinar del Rio and the Banos No. 1 was a joint venture between Standard and Atlantic.

Gulf to Enter Cuba?

Reports indicate that Gulf Oil Corporation is seriously considering entrance into Cuba. The company has maintained a resident geologist in Cuba for several months but to date has not qualified to do business in Cuba and consequently has no concession status.

Cuban operators continue to be fairly active on a limited basis, and such activities are confined to the serpentine areas where the only oil production has been previously obtained. The established producing areas in Cuba include Motembo, Bacuranao and Jarahueca fields.

A 3000-foot test, a deep venture, is expected to be drilled in the Motembo field during 1946. This field produces a high-grade naphtha which can be utilized as motor fuel direct without any refning. The Bacuranao field is practically exhausted.

Currently there are 12 rigs active in the Jarahueca field which was discovered in late 1943. The field produces 37.6-gravity crude oil.

With the shallow beds having been tested, interested parties indicate that the future Cuban oil development depends upon the establishment of deep production.

German Plant in Operation

Operation of the plant for the production of special lubricating oils at the Wintershall A. G. refinery at Lutzkendorf in central Germany has been resumed. The Leipzig radio announced that the first trainload of crude oil had been received at the plant.

Scottish Newspaper Flays Government's Refusal to Increase Gasoline Rations

One of the strongest attacks on the British Government's handling of the oil situation was made recently by the *Sunday Express* which argues that secrecy is preventing a true report of Britain's oil position from reaching the public.

Appeals for increased petrol rations have been consistently refused while, in the contention of the critics, ample supplies exist. Britain's problem in view of her interests in the Middle East is rather to find methods of selling superfluous oil to any customer capable of paying in hard cash. And what is most seriously objected to is the fact that this information is denied to Britain, and Britishers are deluded into the supposition that oil is still in limited supply.

Paper Quoted

"If rationing did not exist the estimated petrol (gasoline) need of all Britain including Eire is 6 million tons (51,000,000 barrels) a year," the *Express* says. Consumption in the last full pre-war year, 1938, was 1,000,000 tons (8,500,000 barrels) less. Our requirements of all oil products, including petrol, are estimated at 10 million tons (85 million barrels) a year, if there were no restrictions. Pre-war consumption was 8 million tons (68 million barrels).

"Who made these estimates? The British government. But the British government stubbornly refuses to give these facts to the nation. Why? Because it inherited the bad old passion of secrecy from Coalition Government, and can't shed it.

"How then is the *Sunday Express* able to give you the figures? Because, although the government can't bear that you should have them, it has given them to the government of the United States. And that government, seeing no sense in secrecy, has 'peached.'

Gasoline Need Cited

"Let us pass on some more secret figures to the nation, which ought to have them. To abolish all petrol rationing we need, as the Government estimate to the U. S. shows, 6 million tons (51 million barrels) of petrol a year.

"Where can we get it? Production in the Middle East had doubled since before the war. Next year the output will be more than 30 million tons (225 million barrels). Abadan alone—which is British owned property—will produce 23.5 million tons (199.75 million barrels) or more than twice what we require to meet our full needs of oil products.

"These figures will enable the petrol-starved people of this ill-used country to decide for themselves how much basis of fact there is in the constantly reiterated official bunkum that you can't have as much petrol as you need because (1) supply is short; (2) we have no dollars to buy more.

"The fact is that Empire petrol supplies are brimming over, and as Abadan petrol is British petrol, we need not spend a nickel on it, far less some millions of dollars.

"No government could get away with such nonsense if the nation knew the facts. That is why the government keeps the facts from the nation. It is absurd that such vital facts concerning us should be spread across the United States, and kept from the people of Britain.

Abundance Is Claimed

"We are facing a petrol problem, but it is a very different problem from that with which Britain is being deluded. Our problem is not how to keep petrol consumption restricted, but how to find a market for our abundance of it.

"For what we're producing we must sell, and sell not only to the consumers in this country but to the consumers in every market where we can get the highest return in dollar currencies.

"The next excuse we shall hear, no doubt, is that there is a tanker shortage which prevents us bringing petrol to this country. The answer is that, according to the estimate of experts, 120 tankers working on round trips could bring to Britain all the petrol we need every year.

"Britain had 400 tankers in September, 1945, and a few have been completed since.

"Surely the provision of 120 tankers out of that fleet is not beyond the resource of such a Government of talent as we are supposed to have today."

Most Refineries in France Intact Despite War Damage

Crude oil refineries in France suffered considerably during World War II from both damage and removal of installations by the Nazis and by Allied bombardment. However, most of the refineries remain intact and are in a state of operation.

Present capacity of French refineries is in the neighborhood of 1,600,000 tons (11,306,000 barrels) annually. The figure which will be able to be reached in the latter part of 1946 will be about 2,500,000 tons (17,822,500 barrels) against 6,870,000 tons (48,976,230 barrels) in 1938, or about 36.4 percent of France's production before the war.

American-Produced Oil In Iran Will be Taxed

The Iranian government has announced that taxes would be collected on American-produced oil of Bahrein Island and that undesirable news stories to foreign points would be suppressed.

The cabinet of Premier Ahmad Qavam, Es-Sultaneh, announced that Iran considers British-protected Bahrein Island in the Persian Gulf an integral part of Iran, thereby challenging the hold which Britain has exercised on the island through agreement with its sheikh since 1892.

Under the proposal, all oil produced on Bahrein Island and shipped to the Iran mainland will be taxed at the rate collected on the production of the Anglo-Iranian Oil Company. In southern Iran, the decree stated, this tax is 80-cents a barrel plus 20 percent of the annual net revenue of the company.

Standard Oil Company of California and The Texas Company operate the oil field on Bahrein Island and a large refinery.

Four-Power Trusteeship of Australian Fields Urged

Trusteeship by the four occupying powers in Austria of the Zistersdorf oil fields has been suggested in an endeavor to settle the outstanding question of ownership. The Vienna radio recently said that Great Britain had submitted to the United States, France and the Soviet Union proposals for a new control agreement.

The U. S. and France are reported to be agreeable to the proposal but Russia had not yet accepted. The trusteeship proposed for the Zistersdorf fields and other industrial assets, the radio declared, would be regarded by the Austrians as a state of "absolute freedom" compared with the present situation, and they urge that steps should be taken to this effect."

Concession Time Limits Spur Companies Operating in Colombia to Great Activity

Colombia's anticipated boost in wildcat activity is getting under way now and should be in full swing soon. The primary reason for its spurt at this time is the concession situation which makes it imperative that much actual drilling must be done by all companies operating in order to fulfill development requirements before expiration dates. Fifteen exploratory wells are drilling or preparing to drill, and others are planned.

The latest operations actually to get under way is moving of equipment by Colombian Gulf Oil Company for two deep wells, Sardinata 1, and Zahino 1, in the Middle Magdalena Valley section, where the company will drill a wildcat on each of two concessions just west of the river and southwest of the production at El Centro. Complete new rigs have been received from the United States, and barged up the river from the port at Barranquilla. The concessions have been the scene of geological and geophysical work during the war years when drilling equipment was not available.

Also in the middle valley area, Socony-Vacuum Oil Company has recently spudded its La Salina 1, in the Las Monas area, and was drilling, at last report, below the 900 feet of surface casing. Several miles east of the company's Pedral 1 which is fishing for drill pipe stuck 1000 feet off bottom, it is in an area where Gulf drilled some comparatively shallow holes several years ago. Socony also is drilling two wells on the Cantagallo concession—Cantagallo 7, testing at a depth of 7690 feet, and Cantagallo 8 drilling below 6217 feet.

Texaco Plans

The Texas Company is preparing to move in equipment for its El Tablon 1, a new wildcat venture in the lower valley. Department of Bolivar, where camp buildings are being constructed and derrick is being built while other equipment is scheduled to move in at once. The company is temporarily delayed at a depth of 4105 feet in its Velasquez 1 in the middle valley area while cleaning and repairing boilers.

Tropical Oil Company, largest producer in Colombia as operator of the de Mares concession, is building derrick for a 12,000-foot test in northern part of the country, southwest of Barranquilla and northeast of Socony's Sinu area. Designated as Tropical's Tubara 1, the well is to be a joint operation with Socony Vacuum.

Tropical, in a joint operation with a locally capitalized company, is drilling Costa Rica 1 in the lower valley region, east of the Magdalena and west of Shell's San Angel operations. At latest report it was conditioning mud and expected to drill ahead below 7200 feet.

Tropical also is making preparations to move a heavy rig to the Llanos area southeast and east of the Andes Mountains to drill the first of a scheduled series of deep tests on its extensive holdings. Applications have been filed on something like 2 million hectares.

Richmond Petroleum Company is below 7500 feet in Caraballo 1, southeast of Barranquilla, still drilling ahead, and a depth of 6000 feet had been reached in its Chorrea 4, current test on the Chorrea concession. Its Guiterrez 1 in the Buenavista area on the Magdalena River is still in shallow surface formations there.

Shell Oil Company's San Martin 2, in the Llanos area, is testing 200-foot section at a depth of 6820 feet, and some 14-gravity heavy oil is being recovered. If the well is commercially productive it would open the first production in this vast area but would pose a difficult transportation problem.

Shell's Chafurray 4, also in the Llanos, is coring below 1700 feet.

In the Lower valley area, Shell's San Angel 4 was drilling below 6410 feet.

Colombian Petroleum Company's 21-K, in the Tibu field, Barco concession, is drilling below 10,134 feet and should reach its projected depth of 10,500 feet shortly. It is located on the west flank of the structure in the southern part of the field.

Phillips Company Releases 666,000 Simiti Lease Acres

The Phillips Petroleum Company, Bartlesville, Oklahoma, has released 666,000 acres of its Simiti lease in Colombia, South America, according to Frank Phillips, chairman, and K. S. Adams, president of Phillips.

Originally covering 960,000 acres, the lease is located along the Magdalena river in the municipality of Bodega Central, Department of Bolivar.

After preliminary examination of the area by field geologist, the acreage was turned back to the Leonard, Benedum and Trees interests. The announcement said the company had no present plans for drilling wells on acreage retained.

Paraguay Plans

Drilling operations by Union Oil Company of California on the first test in the Chaco Territory in Paraguay is expected to begin in June. Camp facilities are now under construction at Santa Rosa, located 265 miles west of the river port of Puerto Casado. Most of the equipment is now at the location.

Russia Adopts Dual Administrative Leadership in Petroleum Industry

Reconstruction of the administration of the petroleum industry in Russia has been arranged by the Praesidium of the U.S.S.R. Supreme Council. The new arrangement is a breakaway from the principle hitherto strictly observed of having the administration of the entire Soviet petroleum industry under a single leadership in that it provides the splitting of this unit into two main groups.

The division sets up two All-Union Commissariats, namely, the People's Commissariat for the Oil Industry of the Southern and Western Regions—comprising the enterprises and organizations for crude oil production and refining and for oil machinery building of the Caucasus, the Ukraine and the Central Areas of the Soviet Union, and the People's Commissariat for the Oil Industry of the Eastern Regions—covering the same function for the Urals, the Volga region, the Far East, Kazakhstan, Uzbekistan and Turkmenia.

Nikolai Baibakov, formerly People's Commissar for the whole Soviet oil industry, was appointed to the newly created post of Minister of the Oil Industry of the Southern and Western Regions, and Mikhail Yevseyenko was named to the corresponding post for the Eastern Regions.

The ultimate aim of the reorganization

■ CONTINUED ON PAGE 48

is to obtain maximum efficiency and speed in reaching the 60 million-ton goal set in February by Generalissimo Stalin for the country's annual crude oil output under the new five-year plan.

Among the tasks facing Yevseyenko will be that of concentrating on the "Second Baku" (Bashkiria and adjacent regions). This was made clear by the Moscow radio when he took office.

"The boundaries of the 'Second Baku' are expanding wider every year, and in the past eight years the number of oil deposits discovered has increased fourfold," a radio spokesman said.

In keeping with Soviet practice, no figures of actual production were given, but it was said that "millions of tons annually" were obtained from those oil fields in which, as has now been proved, "two-thirds of the geological oil resources of the Soviet Union are concentrated."

Meantime, Russian reports say that the practice of dual oil completions has been initiated in the Baku region with good results.

Also, Moscow reports say that an oil pipeline about 1118 miles in length has been completed connecting the Baku oil fields with the Ufa industrial area in the Urals.

M. Zademidko, Soviet Minister for the Construction of Fuel Enterprises, recently stated that plans have been made to build new gas pipe lines to supply Leningrad, Kiev, Sverdlovsk, Novosibirsk, and Minsk.

New machinery for the oil industry is now being constructed at the Kunger Works. Thus another big industrial plant has taken up the production of drilling equipment, and the first installations of deep pumps for wells at Baku and other areas have been completed, reports state.

Shale Works Closed

The Lithgow Shale Oil Works at Marrangaroo, New South Wales, Australia, have been closed, according to foreign press reports. Opened five years ago as a war-emergency measure, the works produced 2 million gallons of crude oil, from which 1 million gallons of gasoline were refined. Although the deposits were not exhausted, their exploitation is no longer considered practicable, now that the war is over.

Australian Imports

During November, 1945, Australia imported 549,386 barrels of gasoline, 64,390 barrels of power kerosine, 1,029,666 barrels of residual oil, and 33,267 barrels of lubricating oil. During the five months period ended last November, the United States supplied almost 72 percent of the lubricating oil, more than 16 percent of the gasoline, but less than one percent of the other items.

Iran

■ CONTINUED FROM PAGE 28

Oil Company, secured a concession in North Iran in 1937 by a lease which provided that the company must drill within two years. The concession was abandoned in 1939 after Seaboard reportedly had spent $500,000 in exploratory work.

In 1932 the Shah of Persia cancelled the Anglo-Persian concession contract which at that time covered all the country except the five north provinces. However, a new agreement was negotiated reducing the concession to its present 100,000-square-mile area and fixing royalty to Iran at about $1.40 a ton. This latter provision was altered in 1940 so that Iran was guaranteed a $16 million a year minimum revenue from the British concession with an escalator clause if production exceeded the guarantee.

Late in 1943 Iran indicated she might grant further concessions in the southern part of the country. Standard-Vacuum and Sinclair interests responded, as well as the Shell group, and negotiations were put under way. While discussions were proceeding, the Soviet vice commissar for Foreign Affairs, Sergei Kavtaradze, appeared in Teheran and expressed his disapproval. Further, he demanded for Russia both oil and mineral rights in the five northern provinces.

The Iranian government called off negotiations with all interests—American, British and Russian—as long as foreign troops remained on Iranian soil. The Russian delegation left Teheran late in 1944 after the Iranian parliament had passed a law requiring that all oil negotiations be reported to it and subject to its approval.

Persian Premier Ghavam last February in Moscow received the proposition for a Soviet-Iranian oil company, an offer which he declined because, he said, Iranian law prevented him from acting.

The present Russian-Iran pact which ended the dispute between those two nations in the Security Council includes the following point:

1. A Russo-Iranian Oil Company is to be created, with Iranians holding 49 percent and Russians 51 percent of the stock for the first 25 years of a 50-year lease. For the second 25 years, the two countries are to share half and half in the company's control.

2. The company's initial territory was indicated on a map and the demarcation of the area was agreed to by both Iran and Russia (See accompanying map).

3. Russia will advance the capital for the company's operations in the form of expenses, equipment, wages; while Iran's capital will be her contribution of the land.

4. Iran retains the right after 50 years to buy out the Soviet interest of to continue the company.

Alaska Naval Reserve

■ CONTINUED FROM PAGE 36

lated to faulting, and may appear at the surface where fault fissures penetrate areas of localization. Although only one seepage has been seen there (Fish Creek, Lat. 70°15'N - 151°40'W), it is still reasonable to believe that the gathering area is likely to be in the broad tabular part of the basin, with migration northward and southward up the opposite flanks.

Oil and gas seepages on the crest of the adequately closed Umiat dome, recently acquired stratigraphic information, and discovery of underlying rocks that belong to geosynclinal, or overlap facies, lead us to believe that if localization of oil in economic volume exists in the region, it will occur in sand reservoirs in localities of overlap (stratigraphic aspect), in sands occurring in simple anticlinal structure (Umiat) or, as at Cape Simpson, in sands related to attitudes of mixed structural control.

Umiat Dome in the southeastern part of the reserve will permit a reasonable Upper Cretaceous or fair test for that area.

Even with the known multiple sand, impervious shale setting of the basin, unconformities and overlap should nevertheless be given high priority in future exploration of the Reserve. It is currently known that one series of beds discordantly overlapping another has provided traps for the localization of oil in an impressive number of fields. It is also realized by the oil industry that the most promising locale for testing an assumed stratigraphic trap is on the crest of an apparent structural trap, even though it may show only a faint sign of departure from regional structure. Accordingly, since all structure from Umiat north to the Arctic coast is either of this low dip nature, or has been truncated, and later concealed by the quarternary transgressive overlap, an intensive search for buried structure must be accomplished by other means than shallow core-drilling or surface study. Geophysics, as revealed at Cape Simpson, gravity meter for reconnaissance, and reflection seismic work for detail would be the most effective and economical means. This procedure should be followed, when practicable by slim-hole, structural, and stratigraphic tests.

The region comprising Naval Petroleum Reserve No. 4 in northwest Alaska, has all the geologic qualifications demanded of a potential oil setting. With its enormous volume of marine sediments, its numerous and conspicuous oil and gas seepages, and remarkable regular structural alignment, it may be legitimately considered the most attractive looking, yet untested petroliferous area in the Western Hemisphere.

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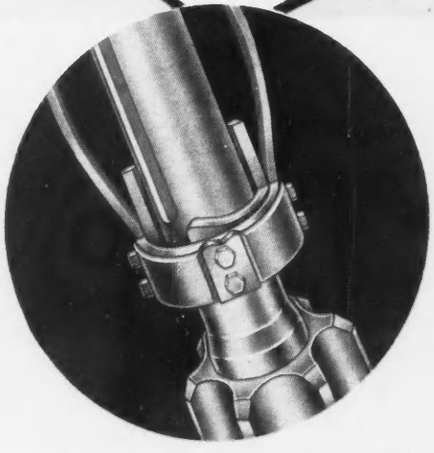

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